New Zealand Department of Agriculture, Industries, and Commerce.

THE

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OF

AGRICULTURE.

Published by direction of the Hon. W. F. MASSEY, Minister of Agriculture, Industries, and Commerce.

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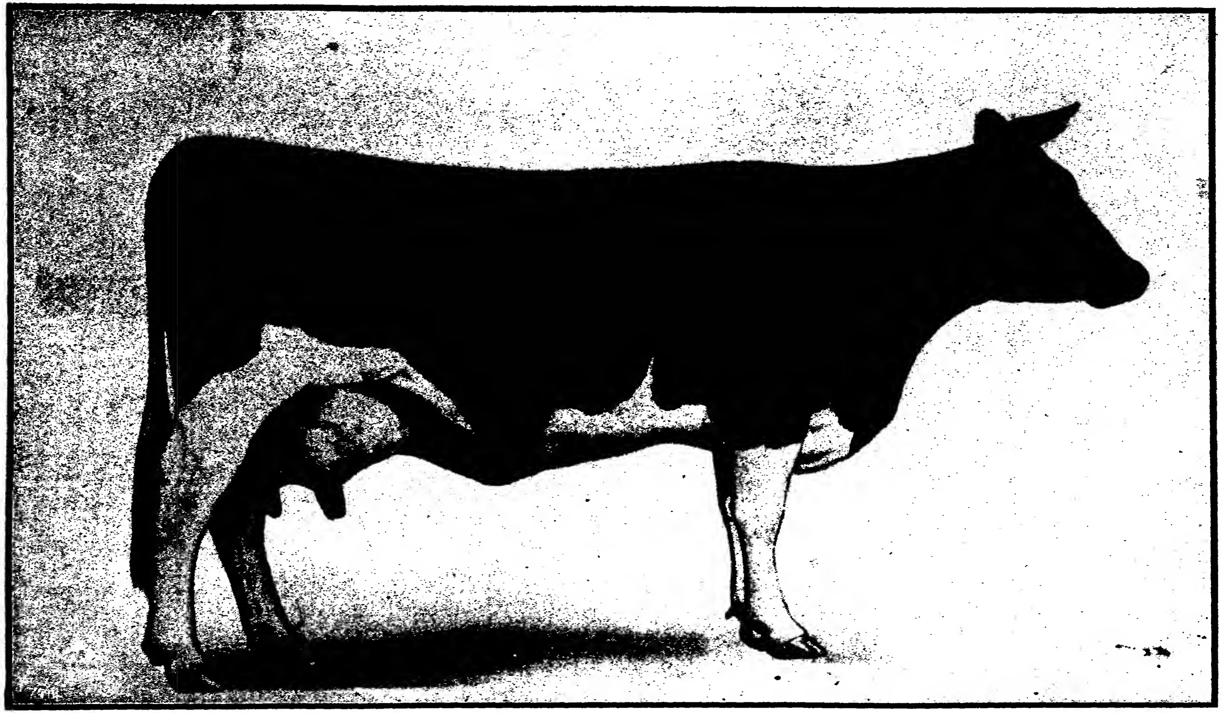

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PHOSPHATES:

THEIR IMPORTANCE TO NEW ZEALAND FARMERS.

B. C. ASTON, F.I.C.

INTRODUCTION.

OF the many factors upon which successful farming in New Zealand depends there are some which may be included under the term "management," capable of being varied by the individual to his own advantage; there are others which may be referred to under "climate" and "prices," and which are beyond his power to alter.

As to management, proper selection of plants and animals may greatly aid the farmer in his journey to the goal of success, but of all the factors contributing to this happy end the manuring of his land is the one which—taking all things into consideration—is easiest to control, and therefore one which should merit his most careful thought and action.

Let us take an imaginary case, which may better explain what it is sought to convey. Assuming that the soil is of average fertility, the season favourable, the tillage adequate, labour not more scarce than usual, prices satisfactory, and the farmer wise in his management with one exception—the manuring; every link in the chain is complete and strong save this one. This may be faulty through sin of omission or of commission: no fertilizer, the wrong one, too little of the right one, or lastly, but rarely, too much of the right one* are errors. In all probability the immediate saving through neglect of this matter has been but a few shillings per acre, an amount insignificant compared with the sum of the other charges for labour, rent or interest, seeding, &c. The net loss through not getting a full crop, however, is out of all proportion. If in a favourable season the measure of a farmer's success may be much diminished by so simple a means, in an unfavourable season how much greater will be the extent of his failure!

ESSENTIAL VALUABLE PLANT-FOODS.

The fertilizer enactments of different countries recognize three essential plant-foods as being of sufficient importance to legislate about, these, in the descending order of their relative cost, being (1) nitrogen, (2) potassium, (3) phosphorus. I shall refer to these in future under the more familiar terms "nitrogen," "potash," and "phosphates."† You will observe that no mention is made of calcium (the metal of which lime is the oxide), iron, sulphur, magnesium, and other undoubted essential plant-foods. These are

* See article on the use and abuse of artificial fertilizers: *N.Z. Journal of Agriculture*, Vol. iii, p. 464.

† The different ways in which plant-foods may be spoken of is a severe stumbling-block to the farmer, unlearned in chemical terms, who would comprehend something of the art of manuring. The simplest method of referring to the three foods mentioned is that in which the amount of each element is quoted thus—nitrogen, potassium, and phosphorus. Under other systems nitrogen may be quoted in terms of ammonia or sulphate of ammonia; potassium in terms of potash (dipotassic oxide) or sulphate of potash; phosphorus in terms of phosphoric anhydride or tricalcic phosphate. It is important for the New Zealand farmer to realize that—

1 part of nitrogen is equivalent to 1·214 parts of ammonia;

1 part of phosphoric anhydride is equivalent to 2·183 parts of tricalcic phosphate;

1 part of potash is equivalent to 1·85 parts of sulphate of potash.

These are the terms allowed to be used by the New Zealand Fertilizers Act, and on the purchase of any parcel of over 5 cwt. of fertilizer the farmer is entitled to demand from the vendor an invoice certificate stating the percentage of plant-food present under these headings. To the farmer wishing to inquire further into the matter the following instructions will be helpful.

usually present in sufficient amounts in average soil, for average crops. They are, moreover, intrinsically of far lower value than the three first mentioned. Of these three, nitrogen—the most expensive—is used either in its insoluble and less expensive form, as the organic portion of bonedust, as dried blood, or as meat-works offal. The soluble nitrogenous fertilizers, such as nitrate of soda, sulphate of ammonia, cyanamide, and nitrate of lime, are usually in New Zealand applied only to special crops, such as potato, mangel, and garden crops. Potash manures come to us almost exclusively from Germany, derived from the great Stassfurt mineral deposits. Potash enters very sparingly into proprietary mixtures for general crops, and although it is used more largely for special potash-loving crops, still in minor quantity compared to phosphates. The comparatively small quantity of nitrogen and potash imported into New Zealand is significant.

In Australia, for the last year of which we have information, 1910, there were imported of purely phosphatic fertilizers 205,489 tons, while of other fertilizers 18,866 tons were imported. Similarly, in New Zealand the purely phosphatic fertilizer imports for the year ending 31st March, 1913, were 87,411 tons, while of other fertilizers there were 12,190 tons. Nitrogen and potash are evidently in the minority. With regard to nitrogen, however, it must be remembered that both Australia and New Zealand are producers of a certain amount of organic nitrogenous manures in the shape of meat-works offal, which is used locally. No potash fertilizers, however, are locally produced.

To convert nitrogen into ammonia multiply the amount by 1·214. Conversely, to convert ammonia into nitrogen, multiply by 0·824. In this way the following table may be used :—

Nitrogen	N	× 1·214 =	Ammonia	NH_3.
Nitrogen	N_2	× 4·705 =	Sulphate of ammonia	$(NH_4)_2SO_4$.
Ammonia	NH_3	× 0·824 =	Nitrogen	N.
Sulphate of ammonia	$(NH_4)_2SO_4$	× 0·212 =	Nitrogen	N_2.
Phosphorus	$2P$	× 2·289 =	Phosphoric anhydride	P_2O_5.
Phosphorus	$2P$	× 4·975 =	Tricalcic phosphate	$Ca_3P_2O_8$.
Phosphoric anhydride	P_2O_5	× 0·437 =	Phosphorus	$2P$.
Phosphoric anhydride	P_2O_5	× 2·183 =	Tricalcic phosphate	$Ca_3P_2O_8$.
Tricalcic phosphate	$Ca_3P_2O_8$	× 0·201 =	Phosphorus	$2P$.
Tricalcic phosphate	$Ca_3P_2O_8$	× 0·458 =	Phosphoric anhydride	P_2O_5.
Potassium	K_2	× 2·228 =	Sulphate of potash	K_2SO_4.
Potassium	K_2	× 1·204 =	Potash	K_2O.
Potassium	K	× 1·906 =	Chloride (muriate) of potash	KCl.
Potash	K_2O	× 0·830 =	Potassium	K_2.
Potash	K_2O	× 1·850 =	Sulphate of potash	K_2SO_4.
Potash	K_2O	× 1·582 =	Chloride of potash	$2KCl$.
Sulphate of potash	K_2SO_4	× 0·540 =	Potash	K_2O.
Sulphate of potash	K_2SO_4	× 0·449 =	Potassium	K_2.
Chloride of potash	KCl	× 0·525 =	Potassium	K.
Chloride of potash	$2KCl$	× 0·632 =	Potash	K_2O.

It is interesting to follow the fate of certain elements in the soil. Nitrogen is readily leached out of the soil by rain, and is lost in large amounts. Calcium and sodium are also washed out of the soil in large quantities, but potassium and phosphorus are lost only in very small quantities. Phosphorus becomes less available—that is, more insoluble—and is abstracted by the crops and stock grown on a given farm. By these means phosphorus is lost, but not through leaching. The manufacture of nitrogenous manures from the inert nitrogen of the atmosphere is already an accomplished commercial success, which relieves us of the haunting fear that the exhaustion of the Chilian deposits of sodium nitrate will mean diminution of the world's wheat-growing capacity.

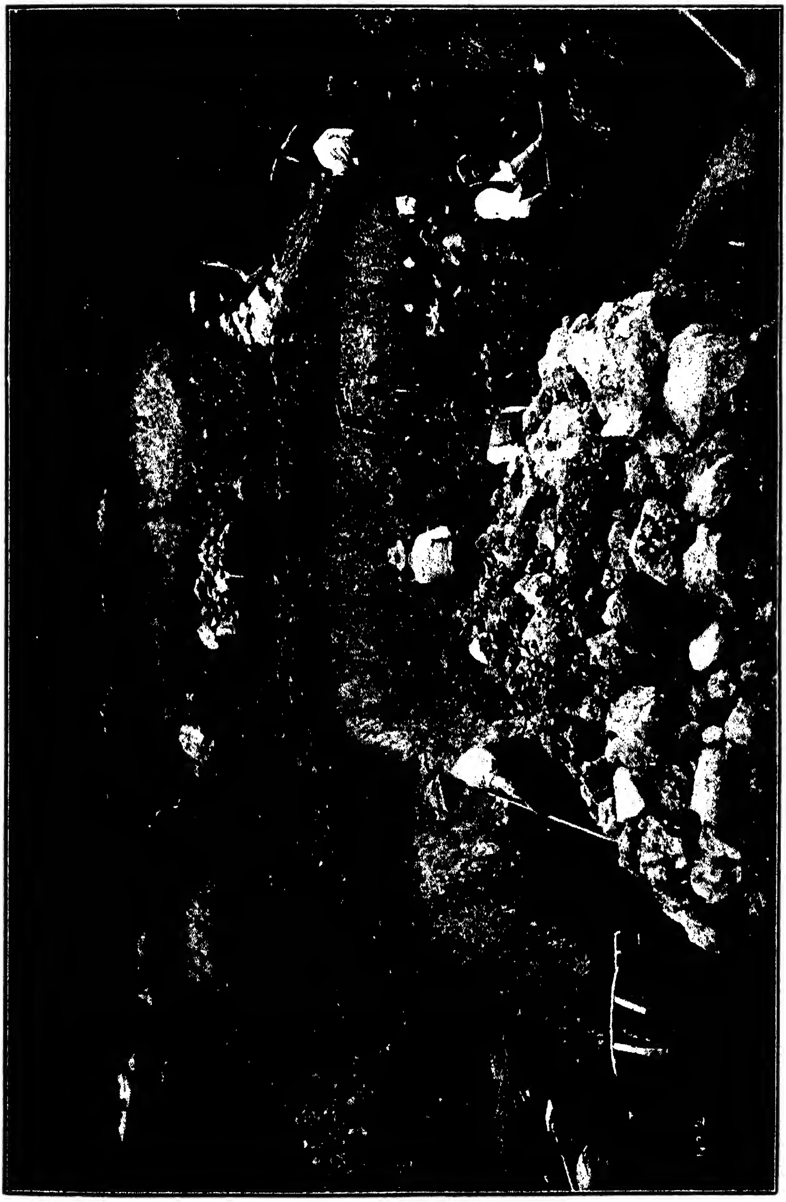
That Australia is so large a consumer of phosphates to the exclusion of nitrogenous manures may seem remarkable when it is remembered that nitrogen is the dominant ingredient required by wheat in Europe. It has been found that on the Australian wheat-soils nitrogen is unnecessary, or even harmful—a result no doubt due to the difference in soil and climate between Europe and Australia, which indicates how important it is that every country should elaborate its own system of agriculture, and not follow blindly the methods of other countries practised under entirely different conditions.

PERHAPS PHOSPHATES ONLY NEEDED.

F. W. Clarke, the great authority on geo-chemistry, computes the amount of potassium in the lithosphere (the solid earth) as 2·45 per cent., and the nitrogen in the lithosphere and ocean together as only 0·02 per cent. (but the atmosphere we know is four-fifths nitrogen). The phosphorus he estimates as only 0·11 per cent. of the lithosphere.

It is highly desirable that the principles of manuring advocated by Dr. Hopkins, of the Illinois University, should be given a fair trial in New Zealand. Briefly, his advice is to rely on green-manuring and the growth of leguminous crops to supply the nitrogen needed, which they abstract from the atmosphere, and to liberate potash from the inert soil-silicates by appropriate and economical methods, and thus render available the potash required. This disposes of the two most expensive plant-foods, the nitrogen costing from three to four times and the potash about twice the price per unit that phosphoric acid does. There now remains to consider how this last food can best be supplied. The American idea is to use the cheapest known form of phosphate of lime*—that is,

* The American farmer can purchase ground phosphate rock at from one-fourth to one-fifth the price per unit which a New Zealand farmer would be charged.



QUARRYING ROCK PHOSPHATE AT MILBURN, OTAGO.

In the extreme top left-hand corner of the picture may be seen an outcrop of phosphate rock—black above, white below.

ground rock phosphate—in the finest powder possible, and to apply it in conjunction with ground limestone if necessary.

Let us now see how we attack this problem in New Zealand. The following table shows the phosphate importations in New Zealand for the last five years:—

PHOSPHATE IMPORTATIONS.

Year ended 31st March.	Bonedust.			Superphosphate.		
	Tons.	Value (Gross).	Value per Ton.	Tons.	Value (Gross).	Value per Ton.
		£	£		£	£
1909	9,143	52,421	5·7	21,910	80,774	3·7
1910	12,177	66,361	5·4	25,228	91,926	3·7
1911	11,058	61,893	5·6	27,442	99,477	3·6
1912	10,799	69,032	6·4	32,567	119,597	3·7
1913	9,281	60,050	6·4	32,964	120,303	3·7

Year ended 31st March.	Basic Slag.			Guano and Rock Phosphate.		
	Tons.	Value (Gross).	Value per Ton.	Tons.	Value (Gross).	Value per Ton.
		£	£		£	£
1909	4,321	14,595	3·4	12,030	38,626	3·2
1910	5,013	16,126	3·2	6,088	15,578	2·6
1911	8,670	28,231	3·3	15,963	42,164	2·7
1912	16,227	53,067	3·3	22,050	61,622	2·8
1913	20,133	66,389	3·3	25,033	65,084	2·6

N.B.—The monetary values are given in pounds sterling and decimal parts of £1. The values are those declared at the Customs; the farmer pays at least £1 per ton more.

Some very interesting facts may be learned from the above statement. It would appear from first sight that superphosphate is the form of phosphate which is imported in the largest quantity, but this is found to be untrue when the compositions of the respective fertilizers are compared. Remembering that the superphosphate and the basic slag average 18 per cent., the bonedust 22 per cent., and the guano 27 per cent. of phosphoric acid, it is seen that the kind of phosphate most largely imported is that in phosphate rock or guano, which is practically the same thing. Superphosphate, however, comes a good second, bonedust third, and basic slag last. Basic slag* is, however, showing signs of rapidly advancing in public favour, for during the last four years the figures representing its

* For a full account of basic slag, which every farmer should read, see articles in the *Journal*, Vols. iv and v, pp. 454 and 25, or Bulletin No. 26, to be had gratis on application.

importation have been going up with leaps and bounds. All the import figures show good increases from year to year, except those for bonedust, an exception which I am very glad to see. The importation of bonedust shows a steady decline since 1910, coincident with an increase in the declared value. Farmers appear to be recognizing that they can pay too much for a good thing, and there is no doubt that other phosphates are taking the place once occupied by bonedust.

I have a strong suspicion that for years the value of bonedust has been overrated. Absence of adequate field experiments renders it necessary to emphasize the fact that this statement is a suspicion merely, which needs proof. Another feature worth noting is the constancy in the declared values of the phosphates other than bonedust throughout the quinquennium under review.*

Sources of Phosphate.

The phosphates used in the fertilizer trade are obtained from many countries. Owing to the increased demands for phosphate several deposits have been either worked out or operations have been limited to the supply of rock to specified areas. This has stimulated search for new fields and has resulted in the discovery of several important finds. To those who carp at scientific expeditions the instance of the important deposit at Christmas Island, discovered by the "Challenger" expedition, may be cited. Our own Otago mines are now turning out 8,000 tons of marketable phosphate yearly. Phosphate may possibly be discovered in other parts of the Dominion, and should be looked for in limestone districts. Isolated fragments of phosphate have been found at Whangarei and at Kaikoura.†

* A matter which often arises in the lay mind is the discrepancy between the unit value of phosphoric acid in guano compared with that in bonedust, superphosphate, and basic slag. Here we have a guano containing 27 per cent. phosphoric acid declared at £2 6s., while a bonedust containing 22 per cent. is declared at £6 4s., a superphosphate containing 18 per cent. at £3 7s., and a slag containing 18 per cent. at £3 3s., per ton. The chemist's refuge under the fire of this sort of question is to say that unlike things cannot be compared. Bonedust contains a quantity of nitrogenous organic matter which doubtless, by its ready decomposition in a warm soil, renders the calcium phosphate more available; superphosphate has had the original phosphate of the rock phosphate, from which it is chiefly made, so altered by sulphuric acid (vitriol) that it is soluble in water, and hence diffuses into the soil and is there precipitated in a very finely disseminated state, much finer than could be got by any mechanical means. Basic slag contains its phosphate in combination with lime and silica; there is also a large proportion of iron silicate and free lime present, which may have some effect on the availability of the phosphate. There is only one way to obtain an adequate reply to the question of what phosphate is cheapest to use, and that is to put the question to the soil itself. Field or pot experiments alone can answer certain questions, but the experiments must be so conducted as to ensure absolute confidence in their accuracy.

† Those interested in the matter should consult the writer's Bulletin No. 1, "Phosphate in New Zealand."

Some twenty-odd years ago the world's total production of phosphate was less than a million tons a year, but in 1908 Voss estimated the production as follows:—

	Tons.
America	2,300,000
Africa	1,544,000
France	350,000
Belgium	150,000
West Indies	30,000
Pacific islands	350,000
Russia, Norway, &c.	100,000
Total	4,824,000

We have thus a fivefold increase in twenty years. In New Zealand in 1901 only some 33,000 tons, which we may be sure was mostly phosphate, were imported; in 1912 100,000 tons were imported, a threefold increase in consumption in twelve years. In many European countries the consumption of phosphate has recently doubled, and if it were not for the newly discovered deposits in Africa, America, and the Pacific agriculture would be in a sad position for want of fertilizers. America is now using about four and a half million tons of fertilizers, and its Government is prohibiting the export of phosphates from the fields found in Government territory. Other countries may follow suit, and even prohibit the export of phosphate entirely. The phosphate used in New Zealand comes largely from Pacific sources, even the Japanese superphosphate having its origin in the Pacific. Ocean and Nauru Islands are estimated to contain fifty million tons of phosphate rock. With an output of, say, its present production (263,000 tons) it will be exhausted in two hundred years. It seems probable, however, that what will happen is that the output will be tremendously increased and that the life of two hundred years may be very much curtailed.

HOW TO EXPERIMENT WITH PHOSPHATES.

In conclusion, some practical advice may be given as to the broad lines upon which experiments in the field with fertilizers should proceed.

In any series of experiments on New Zealand soils it will always be advisable to apply lime in conjunction with the phosphate in one experiment at least. The amount of available lime in the soil has a great influence on the efficacy of the phosphates and the amount it is necessary to apply. The forms of lime best suited to the different soils must be studied as carefully as are the forms of phosphate applied.

A saving in freight, cartage, and bags should be attempted by purchasing concentrated fertilizers and diluting them down with material such as sand, dry earth, or ground limestone, obtained on the farm. I recently had to pay £3 per ton for forty miles cartage of fertilizer which only contained 40 per cent. of phosphate of lime, costing £4 per ton. If the concentrated superphosphate, which is obtainable in Auckland at £9 12s. per ton, containing 96 per cent. phosphate, could have been applied it would have resulted in a saving of nearly £2 per ton on the cartage and freight alone, and yet the farmer would have received the same amount of phosphate.

Another important point is the mixing of one phosphate with another. Farmers are aware of the excellent mixture they can obtain by mixing bonedust with superphosphate, the bonedust with its coarser particles reducing the floury superphosphate to a state that will easily run through the drill. Bonedust has the further advantage that it does not react with the superphosphate when it is in bulk, and the mixture may stand for some days without any conspicuous change taking place. The high price of bonedust is, however, making, and rightly so, the farmer look somewhat askance at its use.

The mixing of basic slag and superphosphate is condemned by some authorities. These, I think, should be disregarded until experiments in New Zealand have decided the matter fully. Certain difficulties attend the application of the mixture. Some farmers have had considerable success with it, others — largely, I fear, through not following directions—have failed. Trials should be made with two parts of slag and one of superphosphate, and also with equal quantities of each. The mixture should be sown as soon as mixed, and not more should be mixed at a time than can be expeditiously dealt with. If chemical action commences to take place and hinders the free running of the mixture, inert material must be mixed in to dilute the constituents.

In top-dressing grass lands it has become usual to apply potash fertilizers in conjunction with slag. Some of these potash mixtures contain large quantities of sodium chloride (common salt) and magnesium salts. Kainit, for instance, only contains some 12 per cent. of potash, whereas sulphate of potash contains over 50 per cent. What one would like to see thoroughly tested is whether potash, sodium chloride, and magnesium salts are necessary individually and collectively, and if they are, whether they could not be purchased separately more advantageously than they are now, and mixed as required.

THE BULL:

WHEN AND HOW TO USE HIM.

J. L. Bruce.

Next to gambling transactions in land and the recounting of sales at ever-advancing prices, wherever two or three farmers meet the amount of the previous month's milk-cheque and the prospective takings for the season are the predominating topics of conversation in all dairying districts. The latter indicates a healthy rivalry and an incentive to increased production; but when it is remembered that the continuance of these more or less satisfactory returns is in a large measure dependent upon one animal—namely, the bull—it is surprising how seldom any reference is made to this important animal, upon which, as a matter of fact, the dairy-farmer's existence depends. In connection with the selection and treatment of the bull there are many features of importance that could be dealt with, but for the present it is not intended to touch more than briefly on these, but rather to deal more fully with his dominating influence in the herd, and the most profitable period of his usefulness.

It should be markedly apparent to any one giving the subject a moment's consideration that the practice so generally obtaining in this country of allowing the bull to run at large with a herd of cows is a very grave mistake, inasmuch as the bull is allowed to exhaust himself unnecessarily. At one time it was no unusual occurrence to find a bull wandering in a paddock with a board upon his face and a heavy cable chain round his horns, with the object of preventing him from destroying fences. This form of cruelty, however, is rapidly disappearing. So far there is not much indication of the bull being kept in isolation by being provided with a small paddock to himself, tethered, or given comfortable quarters and the attention due to an animal upon which so much depends. If this were done, and the cows brought forward for a single service, a great many more cows could be served in a season, and with much better results.

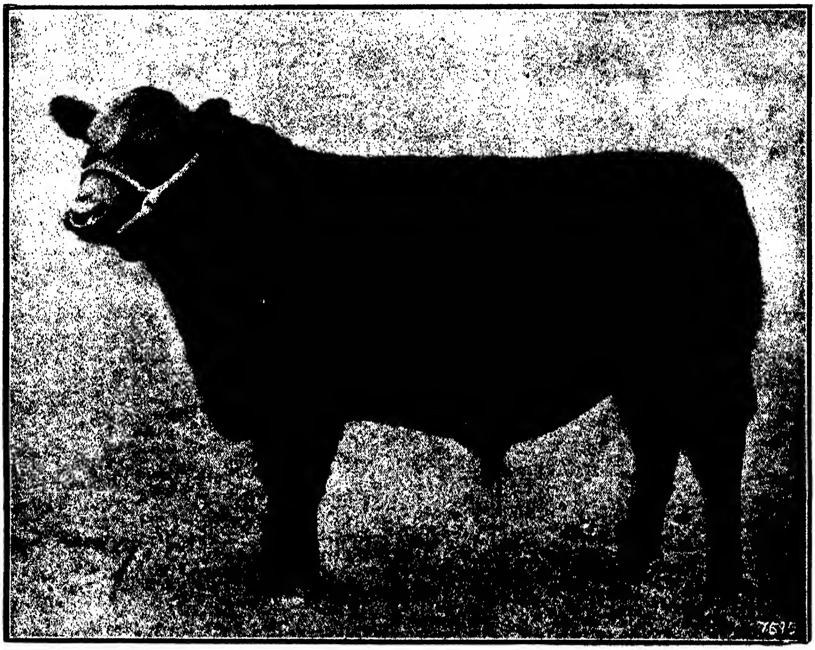
A very general misconception obtains as to the age at which a bull is sufficiently matured to be fit for service, many holding

that aged bulls—say, from three years (on account of their having then reached maturity)—are preferable to the younger animals. Matured heavy bulls are practically useless for breeding purposes unless they have had exceptional care and treatment. Moreover, it is absolutely essential in the breeding of live-stock that there be youthful vigour on one side—that is, either the sire or the dam must be young and vigorous. The sure method of breeding the best stock is to use young vigorous bulls—say, from one to three years old. When a bull reaches three years old he often becomes heavy, and is not a keen server. Statistics show that young bulls from nine to fifteen months old may not be quite such sure stock-getters as the older animals, but the experience of the most successful breeders is that the offspring is very good; and, moreover, that a bull from eighteen months to two years old is at his very best as a sure stock-getter. In this practically all the greatest and most noted stock-breeders in Great Britain are agreed, and prefer to buy their bulls at from nine to twelve months old, and commence putting them to a limited number of heifers at that age, increasing the number as time goes on, and ultimately getting quit of them to the butcher at about three years old. A well-nourished bull is fit for service at nine months, and he increases in usefulness until he is eighteen months old; the period of his maximum usefulness being from eighteen months to three years old, at the end of which period, unless under very exceptional circumstances, he should be disposed of.

It may seem ridiculous to advocate the purchase of high-priced bulls and then discard them after a couple of seasons' work, nevertheless there is abundant proof that it pays handsomely to do so. This is supported by the very best evidence—namely, practical experience—which is the most reliable teacher on all matters pertaining to agriculture. It is admitted by the most successful breeders that the secret of their success has been careful selection and observance of the above rule.

In support of this, and to demonstrate further what may be accomplished by a bull under the very best treatment, there is a case on record where a young bull—one of the Premium bulls in Ireland—served 160 cows before he was eighteen months old, and practically all the cows proved in calf; and, to show further the present tendency of cattle-breeders in favour of the use of young animals, it may be pointed out that the Argentine buyers some few years back would buy only three-year-old bulls, but they have now found out by experience that in this they were totally wrong, and at the present time, as is well known, they will buy only yearlings.

Another feature in support of the use of young bulls in this country is that, as already mentioned, on most of the farms the bull runs with the cows, and whenever a cow is coming in season the bull follows her and never settles from the time she commences œstrum until she ceases. Therefore it stands to reason that after a couple of seasons under such conditions the bull is fit only to be "scrapped." This is becoming more generally recognized, and the use of old bulls is decreasing every year. It may be argued, as discounting the experience of such famous breeders



AN OBJECT-LESSON IN EARLY MATURITY.

Mr. W. J. Birch's imported Aberdeen Angus bull, Premier of Dalmeny, photographed at ten months old.

as Dr. Clement Stevenson, of Polled Angus fame, and Messrs. Booth and Bates, of Shorthorn fame, who have had such wonderful results from the use of young bulls, coupled with keen observation and remarkable discriminating powers of selection, that these men were breeding entirely for beef quality and early maturity. Granting this, it would be interesting to learn why the same should not also apply to dairy cattle. Surely the object in the case of dairy cattle is also that of early maturity, and consequent usefulness at an early age as a milk-producer.

Apart from the question of earlier maturity and general superiority of the progeny of young bulls, it is held by many that, as a bull has not reached maturity at three years old and therefore should only be coming to his best at that age, he should be fit for at least two more seasons. Granted that in exceptional cases, when it is expedient to procure as many of the progeny as possible of a particular bull, he may be kept for a longer period, provided he has a good constitution, has been kept in hand and well cared for, and is a keen server. In this case he should be kept away from the herd and only brought forward for service to a limited number of young cows; but if he be a heavy animal, and inclined to be a slow server, he should not be put to heifers. If it be found that the cows are returning he should be promptly discarded. Notwithstanding this, there is abundant proof that the progeny of younger bulls are better animals, and any one desirous of improving his herd will do well to adhere strictly to the use of young bulls.

In past years the main point with many dairy-farmers has been to get their cows in calf no matter what age, breed, or combination of breeds the bull might be. Consequently the inevitable happened, the progeny was often scant, and each generation was more unprofitable than the preceding. Breeding on these lines could have only one end—viz., ruination.

Experience has to a large degree ended this, but if our herds are to be improved, much has yet to be accomplished by the general adoption of a more intelligent system of mating. It is within the reach of any dairy-farmer owning even a very ordinary herd of crossbred cows, by proper selection of his bulls, in a very few years to improve his herd to an extent almost inconceivable to any but those who have actually seen and experienced the transformation. It is within the writer's personal experience that, by careful selection and the use of young purebred bulls of the very best blood in Great Britain, a herd of crossbred cows was improved to such an extent that over £40 per head was obtained for some of their progeny as fat bullocks at two years and nine months old, averaging over £35, as against about £25 at three years and over, and this was attained in less than ten years. In support of this, take the Argentine buyers, who, regardless of price, are buying up the best-bred young bulls in Great Britain every year. Why do they do so? Simply because it pays. This being so in the case of beef-cattle, it may safely be accepted that equal, if not better, results can be obtained with dairy cattle. Further, it ought to be the aim of every dairy-farmer to improve his herd and ultimately to transform it to a higher standard of

productiveness and general utility, and this even to an extent beyond his most sanguine expectations.

HOW TO PROCEED.

Adopt and strictly adhere to a system of ascertaining the capabilities of every cow in the herd as a milk-producer, not only noting carefully the yields, &c., of each individual cow, but in every case where there are some of the progeny of any cow in the herd the yields of the whole family should be carefully studied. If the yields from both the cow and her progeny be unsatisfactory, get rid of them as soon as possible; but where the yield is satisfactory, and more especially where the yield from the whole progeny is also good, no matter what breed or mixture of breeds this family may represent, stick to them as a foundation upon which to build a portion of the future crossbred dairy herd.

Constitution should never be overlooked. Weakly constitutioned and weedy animals, even although their records as milkers are fairly good, should be parted with as opportunity offers. From this point the degree of success in the building-up of a dairy herd depends upon the owner's capability as a judge of dairy cattle and his subsequent treatment of them, but the crux of the whole matter lies in his ability to select a bull. Having decided which breed of dairy cattle is best suited to his purpose, his selection should then be made from the very best pedigreed purebred cattle of attested milking records, always remembering that the bull is more than half the herd. Never depart from this, and continue consistently with bulls of the same breed, having a robust constitution, and, as near as possible, the same type, always remembering that apart from milk-production the buyer likes something to please the eye and is willing to pay for it.

Every young bull bought should be, if possible, a better animal than his predecessor, even if it be at a cost in excess of the purchaser's means. At this stage, if it pays to borrow money for any purpose, it will do so doubly in the purchase of a purebred pedigree and milk-record bull; he cannot be too good even for a crossbred herd.

Possibly few if any dairy-farmers will differ from this, while some may disagree with or still be unconvinced as to the superiority of young bulls over older animals. Seeing that the history and experience of stock-breeding in this country is only in its initial stage, and many have not had the opportunity of studying the subject, it is suggested that those interested might with advantage recall past experience regarding the progeny of young bulls, and

watch carefully future results for a few years, after which, no doubt, their experience will coincide with that of the highest authorities in other countries.

While the main objective of this article is to emphasize the sound principle of using the bull at an age when he is possessed of his greatest power of procreation, this implies the necessity under such conditions of taking every means at command, especially by generous feeding, to ensure the young sire having the necessary constitutional vigour. He must be fed from birth in the best possible manner, and this cannot be emphasized too much. While it is poor economy to stint any growing animal, it is fatal to success in the development of the young sire, especially if he is to be used, when he should be, in the vigour of the first years of his maturity.

SILVER-BEET.

THE variety display of silver-beet at the Department's exhibit at the Palmerston North and Hawera Winter Shows is illustrated on the following page. The principal varieties shown were grown by J. C. Anderson, Esq., Stirling, Otago, and at the Weraroa Experimental Farm. As a number of inquiries have been received as to the correct varieties to be used and where seed of these may be obtained, it may be mentioned that the varieties which have proved to be most valuable for stock-fodder purposes are Nos. 1 and 2 illustrated in the last issue of the *Journal*, page 591, both being entitled Swiss chard, or silver-beet. The plants were not fully matured at the time the photographs were taken. Both varieties are characterized by a plain leaf with a broad white stem and thick midrib. There are other varieties which may prove equally good, these having a broad stem and thick midrib but with a curled leaf.

It is impossible to give any information as to how seed of these special varieties may be secured at the present time. A difficulty is presented that it is only in New Zealand (and this through the agency of the Department) that the value of silver-beet as a forage plant has been demonstrated; therefore seed is not known to commerce in any quantity. All a grower can do at present is to purchase silver-beet seed from a reliable seedsman and select his future seed himself. The procedure should be to eat

off the crop several times and, to prevent cross-fertilization, dig out all undesirable plants and allow the desired varieties to seed. It is expected within a few seasons that some of the leading seed firms of the Dominion will be able to supply seed of silver-beet of the best variety for our purpose.

THE SILVER-BEET DISPLAY IN THE DEPARTMENT'S EXHIBIT AT THE PALMERSTON NORTH AND HAWERA WINTER SHOWS.

Hoggets at the Weraroa Experimental Farm having gone off in condition, owing, apparently, to their being affected with stomach-worm, they were removed to a dry paddock and fed with crushed oats and wheat and meal, a supply of mangels being also carted out on the field. This had an immediately beneficial effect, the hoggets rapidly improving in condition.

DAIRY - FARMING.

PRIMROSE McCONNELL.

THE subject of dairy-farming embraces so many things, all of which are of very great importance, that it is impossible here to do more than touch the fringe of the more important phases of the industry. The field, indeed, is so wide that it is a matter of great difficulty to confine oneself within reasonable bounds.

A man may show wisdom by refusing to accept new ideas without obvious evidence, but the so-called scepticism that hides mere indifference has nothing to commend it—and it is to be feared that disinclination, rather than distrust, is the chief guide to many in deciding such points. I would here attempt rather to emphasize the old than to advance anything that is startlingly new. We are in no danger of suffering from *lack* of advice; the danger lies in having to endure a redundance, and he is a wise man who takes his readings "with a grain of salt."

I trust there is no one who will read this who has, in his own opinion, nothing to learn in any branch of agriculture, for such a man has no business in this lower world—his proper place is paradise. No doubt many, like myself, have had a lifelong experience of dairy-farming; but if your experience has led you in the same direction as my own, you will have come to a like conclusion—namely, that the more we know the clearer we see there is still much to learn, and the more we realize the foolishness of dogmatizing. The horizon in knowledge is never reached—it simply recedes the further we advance; and no limits to agricultural knowledge can even be imagined. It would be a drab world indeed if there were nothing more to learn, for it is the knowledge of our ignorance and an accompanying desire for improvement that gives a real zest to human life.

I was much struck by a paragraph I came across in an agricultural paper the other day which read as follows: "I have lived a good many years; I have tried to be a close observer of the things about me on the farm; I have read all I could, and I have kept all I could understand; but this I have come fully to believe: that of all the great mass of stuff that comes to us as knowledge, the things we *think* we know, there is but little of it we do know:

that sticks to us, and *that* we can count on day after day as being really so."

If we are to be honest with ourselves we must admit that the writer is correct in his conclusions, and that what seems to be the truth to-day may be negatived to-morrow. This may seem somewhat discouraging, but such failures should serve to stimulate rather than alarm the enthusiast. Agriculture has a wider field for the ambitious to work in than all other economic sciences combined, and of all branches of that work none gives a wider field than dairy-farming. In fact, as some one else has said, "a man who is a successful dairy-farmer is on the top rung of the ladder of agricultural achievement."

Strange to say, the dairy-farmer is often described as a specialist, but no profession under the sun is so far removed from specializing; indeed, no farmer can ever become a true specialist in the correct sense of the word, and, although he may direct his attention more to one line of his profession than another, he must always be a man of very many parts. The man does not deserve the description "dairy-farmer" who merely keeps a certain number of cows with a male animal at their head, and who is satisfied if he draws a limited quantity of milk from his herd morning and evening, and trusts that providence will provide a fair quantity of food on his pasture. Such a system is delightfully simple (some one else has expressed it as extravagantly simple), but it can have no place in up-to-date dairy-farming. Just let us look for a moment at the necessary qualifications of a successful dairy-farmer: He must understand the cultivation and manuring of his soil in order that he may produce the greatest amount of suitable food on the smallest possible area; he must have a knowledge of how to rear his stock in the most efficient and economical manner; he must make a study of the laws of heredity in order to breed on the right lines; he must be something of an engineer, something of a chemist, something of a botanist, something of a veterinarian, something of a great many other things; and if he manufacture his own dairy-produce he must be well up in the science of the dairy. If he means to keep abreast with the times he must be a reader, and in reading he must be able to discriminate to some extent between the useful and the useless; and he must have business habits, the most important of which is punctuality (perhaps few of us realize how much is due to the latter qualification in successful dairy-farming). He must be the very essence of perseverance, and realize that for him an eight-hours day or six days in the week can be indulged in only on very rare occasions. To be completely successful with his stock he must know them all thoroughly, and

have an affection for them second only to that for his family. If he looks upon them merely as tools for money-making he will defeat his own ends, and the money he makes will be of small account.

Building up a Dairy Herd

Now, in building up a dairy herd I recognize the enormous difficulties with which many New Zealand farmers have to contend. In many cases both capital and experience are extremely limited, and for such the undertaking is comparatively slow. The demand for dairy stock is now so keen that it is a difficult matter (if not impossible) for a beginner to gather up a reliable herd at once. If he buy in the saleyards, let it be heifers only: the saleyard cow is, as a rule, a cull. Better be possessed of a few heifers and reliable cows bought at dispersal sales than to be the possessor of a large herd of culls that will not yield sufficient butter or cheese to pay for their keep; and the owner will soon feel that the work of attending upon such a herd is the very worst kind of drudgery, while good cows require no more attention and are a continual source of pleasure. When a choice offers itself, the selection must be made by type and conformation in the absence of a pedigree of performance. A good type will have a great capacity for storing and digesting a liberal supply of food, an indication of such a capacity being a large mouth, good length from the shoulder to the hooks, and well-sprung deep ribs. As a sign of good digestion the skin should be soft and pliable but not too thin, and the hair fine and velvety to the touch. A heavy, hard skin with wiry hair almost invariably denotes a bad thriver, which means bad digestion. A full eye will denote a nervous temperament such as gives vitality to the many parts of the body. On the other hand, the eye that is *extremely* prominent may be indicative of a weak constitution, as is the case among human beings. The ribs should be wide in themselves and have plenty of space between them. All good dairy cows persistently chew the cud when not eating. The udder should be capacious but not pendulous, rather should it be attached high, and when empty it should hang in folds of loose elastic skin. Good development of the fore udder is an essential point, and for great udder-development it is necessary that the thighs be incurved. The neck should be fine, of fair length, with a clean throat, and light dewlap; and the whole appearance of the cow should be feminine. There are many other points, such as escutcheon, milk-veins, &c., that are indications of good dairy qualities, but none are infallible; and, as a matter of fact, the only real test of the dairy qualities of the cow is the milk-record.

Having got the nucleus of a herd together, the owner should realize that if he expects the herd to do well for him it will demand treatment tending to accomplish that end. In order to succeed he must have a love for his work and take a real delight in attending to the wants of his cows. This will create a kind of sympathy between owner and cow, culminating in the best possible results. He must know his cows individually, and study their likes and dislikes, and treat them with patience and kindness at all times. He must realize that the herd which comes to be milked when called will be infinitely more profitable than the one which has to be forced in with the aid of a dog and stockwhip.

SELECTION OF A BULL.

The next thing to be attended to is the choice of a sire; and although the average farmer cannot afford to commence with a herd of purebred cows, on the other hand he should, at any sacrifice, procure a purebred sire. It should, of course, be the ambition of every farmer to improve his stock, and this end may be greatly hastened by the use of a sire of undoubted milking strain. The old saying, "The bull is half the herd," should be taken to heart. You have no doubt often heard it said that if a man has a herd of, say, fifty cows, and assuming that they breed twenty heifer calves, these calves would possess half the blood of the bull, and the influence of the bull on the heifer calves would be as much as that of the fifty cows. This is not strictly true (as experience teaches us), but it may safely be taken as one of the most useful rules in herd-building. When a farmer persists in using a cheap mongrel bull he is employing the best means of courting disaster; and I am quite convinced that the use of inferior bulls is one of the very greatest hindrances to progress in dairy-farming. Neither should a bull be purchased because he has a pedigree, unless such pedigree prove that he has descended from ancestors who were possessed of undoubted dairy qualities and robust constitution. Such a bull is never too dear.

Once the breed of your sire is chosen, stick to it through thick and thin; do not commence crossing and recrossing. If we persist in indiscriminate breeding no real success need ever be looked for; and it is the persistent crossing of all kinds of live-stock that is the bane of the whole live-stock industry. It is the utmost folly for a dairy-farmer to expect that he can ever improve his dairy herd by such a system. A good herd may be built up from crossbred cows by the use of a purebred bull possessing an undeniable pedigree of performance, while the use of a scrub sire as a

foundation brings about evils which take years to eradicate. It is not my intention to recommend any special breed of bull, although, like every one else, I have my favourite breed. I recognize, however, that other dairy breeds have their good points. But, whichever one is chosen, it should be remembered that to be successful requires the greatest care and attention on the part of the breeder. Ancient history clearly shows that when breeders become careless and indifferent every trace of what is known as fine-blooded cattle is eradicated in a quarter of a century.

THE MILKING SHORTHORN.

DURING the course of the Hamilton and Palmerston North Winter Shows meetings of dairy-farmers interested in the milking Shorthorn were held with the object of forming societies to advance the breed from a milk-producing point of view. Associations were formed at each centre, the stated objects being to establish milking Shorthorn herd-books, a feature of which would be a register of merit, inclusion in which would be granted only on an animal passing an inspection test (conducted by selected authorities), and a butter-fat test for the full milking season, established under official supervision. It is hoped by this means to develop the milking-qualities of the Shorthorn stock of the Dominion, and thereby provide the means whereby farmers interested in dairy Shorthorn stock may be able to secure a bull of undoubted dairy blood. It is believed that with a supply of milk-record Shorthorn bulls the breed would rapidly come into favour again in this country.

The twenty young Holstein bulls that will be available for sale from the Weraroa Experimental Farm this year are coming through the winter well.

LUCERNE HAY.—The Jersey cow, Lady Ida (of the Ruakura Farm of Instruction herd) is recovering as a result of feeding with lucerne hay. Two weeks ago she was completely dry and her appetite almost gone. She was then fed with lucerne hay, which she took to at once, and at the end of five days her milk had returned, and her appetite is now almost normal. This hay has also had a marvellously beneficial effect on other cows and calves, an improvement in their constitution being quite noticeable at the end of five days. Good lucerne hay seems to be invaluable, possibly a great deal more valuable than the green fodder.—*Primrose McConnell.*

SILOS.

THE TYPE SUITABLE FOR NEW ZEALAND.

W. DIBBLE.

WHILE silage in the stack form will probably always appeal to the man on a large holding, especially if he be a grazier who intends to use it for feeding to farm stock in general in dry spells or when pastures and crops fail, the preparation of silage in a specially constructed building should prove an attractive proposition to the dairy-farmer, especially where it is necessary to manage a small farm in the most profitable manner. An advantage of the silo is that "waste" is greatly minimized, while the silage is of an improved character. In several countries, notably in Canada and in the United States of America, the silo is rapidly coming to be appreciated as a necessary part of the equipment of a dairy farm. There, however, the conditions are quite dissimilar to those in this country. The winter is severe, and stall feeding of the stock is imperative. As a means of providing an ample supply of succulent fodder in the colder months of the year, the silo presents an almost indispensable adjunct. With the rigorous winters of such countries it is necessary to construct silos of a very substantial character, much more so than would be required in our milder climate.

In considering the style of silo best adapted for the New Zealand farmer's requirements it is perhaps unnecessary to discuss the stone, concrete, or brick structures favoured in America, but rather to describe the silos popular in Australia, that form being specially recommended which is made of sheets of steel. This is not only capable of being simply constructed, but can be dismantled rapidly and removed from farm to farm.

The first principle to be emphasized in silo-construction is that the silo must be absolutely airtight, and it is more easy to make a structure watertight than it is to make it airtight. The object, of course, in excluding air is to prevent decomposition. A certain amount of fermentation takes place by reason of the air present in the interstices of the silage itself, but as the oxygen is used up the fermentation ceases, or at least proceeds at a very slow rate.

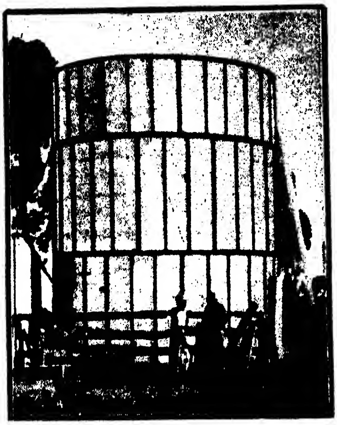
The silo, therefore, requires to be well built, not only to make it capable of excluding air for the time being, but also to ensure that the structure will be airtight in subsequent seasons. For this reason the wooden stave silo, which was regarded at one time as the best substitute for the more enduring and expensive form made of brick, &c., has come into disfavour. When emptied it is often so seriously affected by weather-conditions, especially if not thoroughly well constructed, that it entails constant repair or fails altogether to maintain its desired airtight character.

The particular silo recommended is known as the portable all-steel silo. This is constructed of sections of several sheets of steel attached to iron framework, the sections, in semicircular form, being supplied intact by the manufacturer. The complete sections are simply bolted together on the farm. The framework comes on the outside, a smooth surface thereby being provided on the interior wall of the silo, thus enabling the material to settle down evenly. The roof of galvanized iron is constructed on the farm. It is advisable to provide a concrete foundation, to which the steel frames may be bolted. Drainage must be provided for by a groove in the concrete.

ALL-STEEL PORTABLE SILO.
Small size, showing complete section being placed in position.

The sections of steel plates described are on the market in Victoria, and have been adopted by the Victorian Department of Agriculture. The principle may be studied from the illustration published herewith. A settler at Shannon, Mr. M. Moynihan, has arranged to import the necessary steel sections from Victoria for a 75-ton silo. The cost of these in Victoria is £48, to which must be added the cost of roof, foundation, &c. When this is erected full details will be published in the *Journal* as to cost in New Zealand, method of construction, &c. Quite a number of these

portable steel silos have been erected by the Victorian Department of Agriculture for dairy-farmers of its State, and these have given every satisfaction. The advantage of portability is undoubted. It makes the silo a part of the movable plant of the farm, and presents no difficulty in erection.

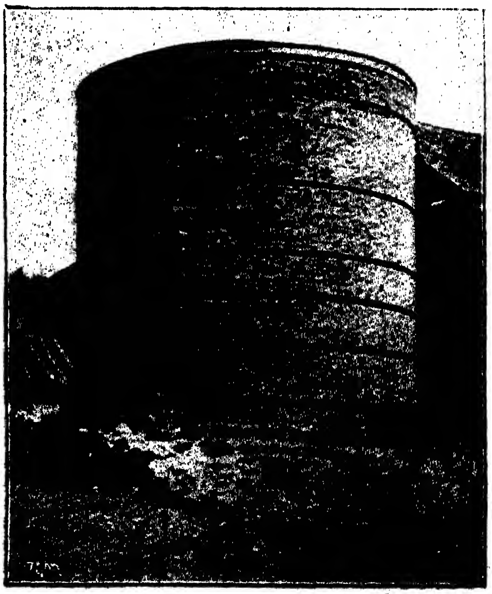


Large Pattern of All-steel Silo.

Whatever the amount of silage to be made, it is always preferable to have two silos, so that one may always be ready waiting to be filled with any catch-crop not required for the purpose originally intended. Again, where a large silo is employed there is always a danger of too much delay in utilizing the silage, and, unless there be a heavy demand on it, it may deteriorate and become useless; whereas with the smaller silo the material can be used up when it is still in its best and most succulent condition.

Filling the Silo.

Whatever the style of silo adopted, it is always advisable to chaff the material before placing it in the silo. The Americans provide an excellent plant for this purpose—a combined chaffer-and-elevator, or chaffer-and-blower (the latter requiring more power than the former). These can be operated by an oil-engine, while a small size is made which can be driven by tread-power, using a horse or bull. The chaffer-and-elevator and the chaffer-and-blower are here illustrated. The elevator should be 25 ft. to 30 ft. in length, in order that the silo may be made of sufficient height. Of course, the material can be placed in the silo

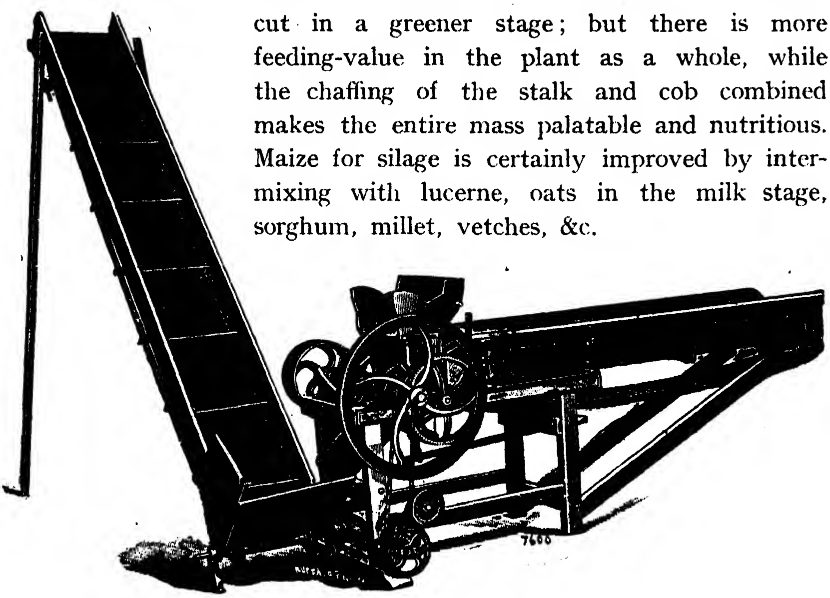


American Brick Silo.

without chaffing, but less material will be stored, and the quality of the silage will be inferior.

MATERIAL FOR CHAFFED SILAGE.

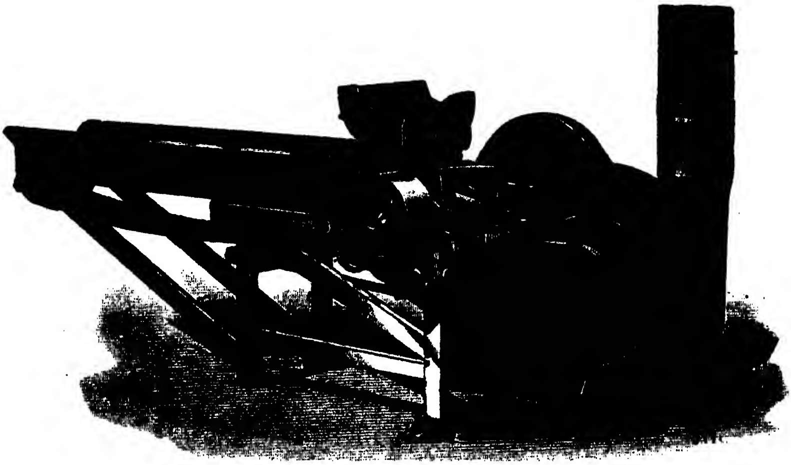
While any plant of fair feeding-value is suitable for chaffed silage, the fact must be remembered that the quality of the resulting silage depends largely on the material from which it has been made. There is nothing better for the purpose than maize, and when this is allowed to develop till the cob has become glazed the greatest weight of material and feeding-value is secured. Of course, the stalks will contain less succulence than when cut in a greener stage; but there is more feeding-value in the plant as a whole, while the chaffing of the stalk and cob combined makes the entire mass palatable and nutritious. Maize for silage is certainly improved by intermixing with lucerne, oats in the milk stage, sorghum, millet, vetches, &c.



CHAFFER-AND-ELEVATOR, WITH TRAVELLING-TABLE AND CHAIN ELEVATOR.

In filling the silo the same procedure as to maintenance of temperature should be followed as in the case of the stack form. The first layer should be from 6 ft. to 8 ft. in depth, and this should be allowed to settle till a temperature of 130° has been reached. Filling should then proceed at the rate of about 5 ft. daily, care being taken all the time to keep the mass spread evenly and the sides well tramped down. To make the material settle well at the sides it is advisable to pour a little water around the edges when the silo is half filled and when the filling is completed. A good idea sometimes adopted to make the sides settle down evenly with the centre is to place small bags of sand or

earth around the edge when the filling is completed. Afterwards a layer of sawdust may be used with excellent effect, to exclude



CHAFFER, WITH BLOWER ATTACHED.

the air from the top layer, or anything that will exclude the air will do.

CONCLUSION.

It is realized that in recommending the silo to the dairy-farmer the initial cost is greater than with the stack form, but it will probably be found that in subsequent seasons the annual expenditure on preparing silage will be no greater with the silo than when stacked in the ordinary way; while there will be less waste of valuable feeding-material and the general quality of the silage will be greatly improved.

A hand-saw is a good thing, but not to shave with; just so a beef-cow is a good thing, but not to produce milk with.—*Hansen's Dairy Bulletin.*

Adelaide, a member of the Shorthorn herd of the Ruakura Farm of Instruction, has finished her season with a record of 415 lb. of butter-fat. In the previous season, which was two months longer, she gave 438 lb. This season she was dried off while still yielding 100 lb. of milk weekly, as she was about to calve in a very short time. A two-year heifer in the herd has reached 300 lb. of butter-fat, and is still giving 100 lb. of milk weekly.

SOME DISEASES COMMUNICABLE FROM ANIMALS TO MAN.

WITH SPECIAL REFERENCE TO NEW ZEALAND.

[*An address delivered before the Conference of School-teachers, Hawke's Bay Education Board, by H. A. Reid, F.R.C.V.S., D.V.H., F.R.S.E.*]

THAT certain diseases common to animals may be transmitted to man is a fact generally well known, but particular information on this question is very often vague or unreliable. I therefore propose to present to you in a concise form the following remarks upon the risks the human subject runs of contracting disease from animals, and to indicate also the common modes of infection. My observations will be limited to such diseases as immediately concern us—that is to say, to those occurring within the Dominion of New Zealand.

For the purpose in view, the diseases transmissible to man may be classified as (1) bacterial diseases, and (2) diseases due to animal parasites. Included in the first class are tuberculosis, anthrax, cow-pox, tetanus, actinomycosis, ringworm, and bacterial necrosis. As in my former lecture we have considered very thoroughly the question of infection by tubercle bacilli of animal origin, I shall have nothing further to say on the subject of tuberculosis.

Dealing with the remaining diseases seriatim, we have anthrax. Cases of anthrax occurring among animals have not of late years been recorded in New Zealand. Some years ago anthrax was introduced into this country from India through a consignment of bone manure containing the germs of this disease, the bones, no doubt, having been obtained from animals which had succumbed to anthrax. The organism of anthrax is remarkable for its ability under certain conditions to form so-called "spores." These are minute, seedlike bodies which lie within the bacterial cells. These spores have very considerable powers of resistance. Their function is to enable the organism to perpetuate its species under conditions which would prove rapidly fatal to the non-sporulating organism. Thus in a dry condition the spores retain their power of reproduction for years; they resist boiling for five minutes, and in order to destroy them dry heat at 140° C. must be applied for several hours.

In order to minimize the risk of reintroducing anthrax into the Dominion, a law was passed enacting that all manures of animal origin must be sterilized efficiently before shipment, and the Government has appointed officers at the ports of Calcutta and Sydney whose duty it is to see that this regulation is properly carried out. The domesticated animals most commonly attacked are cattle, sheep, pigs, and horses. The disease may be transferred to the human subject by handling anthrax carcases and their products.

Anthrax contracted by inoculation through the skin, owing generally to the presence of a wound or abrasion, manifests itself in the form of a "malignant pustule." This very often occurs among porters employed in carrying hides of animals which died of anthrax. As the name indicates, malignant pustule appears as an extremely acute boil or carbuncle, which in the course of a few days becomes blackened in the centre. Cases of malignant pustule contracted through the bite of a fly which has fed upon an anthrax carcase have also been recorded.

Wool-sorter's disease is a form of anthrax sometimes contracted by persons engaged in handling wool containing the anthrax spores, which are inhaled into the lungs with the dust. It is a very fatal example of this disease. Infection by consuming the flesh of anthrax carcases does not appear to be common, probably on account of the fact that ordinary cooking processes as a rule destroy the anthrax bacillus; moreover, the gastric juice is fatal to the non-sporulating organism.

Cow-pox, or Vaccinia.—Affects chiefly cows, but is transmissible to sheep, goats, horses, and man. It is caused by an extremely small micro-organism, so small, indeed, that it cannot be seen under the highest magnifications, while it is capable of passing under pressure through the pores of a porcelain filter. On this account the organism, in common with others possessing these properties of minuteness, has been termed "ultra-visible."

The virus of cow-pox has a close relationship with that of smallpox, and affords protection against the latter disease in the practice of vaccination. The virus is confined to the lesions in a case of the disease, and these in turn are localized chiefly upon the udder and teats of the affected cow. The vesicles which appear are sometimes broken in the process of milking, the lymph escaping into the milk-bucket, and such milk, if used for human consumption, may infect children and adults. It should therefore not be used for the food of man. The milker himself, should there be any cut or abrasion on his hands, may become infected with cow-pox, and thus inadvertently vaccinate himself against smallpox.

Tetanus, or Lockjaw.—Occurs most frequently in the horse, but is found also in sheep, goat, cow, and man. The cause is the bacillus of tetanus. This organism is peculiar in that it grows only in the absence of oxygen, and forms spores which develop at one end of the baccilus in the shape of a rounded knob, giving it the appearance of a pin or drumstick. The organism is found commonly in manure and soil, where it leads a saprophytic existence. When inoculated into a wound together with some other pus-producing organism, such as are nearly always present on the skin, it is followed by symptoms which usually manifest themselves by the characteristic appearance of lockjaw, or inability to open the mouth freely. Deep punctured wounds are especially liable to be followed by tetanus, and the symptoms very often appear when the wound is beginning to heal up.. The organism of tetanus remains near the seat of inoculation, and produces a toxin which is absorbed, and passes along the nerve trunks to the central nervous system, where it acts upon the motor nerve centres. The tetanus toxin is extremely virulent ; a fatal dose for an average adult is estimated to be about $\frac{7}{3000}$ of a grain. The symptoms appear a few days after inoculation, and the disease is very often fatal. Tetanus is seldom or never contracted by man from the lower animals. Infection in this manner might occur through manipulating an infected wound, but the danger is almost negligible. When infection does take place, it is, as a rule, through wounds which have become soiled with dirt, particularly stable manure, garden soil, and suchlike material.

Actinomycosis.—Commonly called "wooden tongue." This disease is due to a species of fungus which ordinarily lives a saprophytic existence upon certain grasses and grains, such as barley. The particular fungus, or "actinomyces" as it is technically termed, gains access to the tongue and sides of the cheek through any slight abrasion during the process of mastication. Frequently the fungus is admitted through an alveolus during a change in dentition. It sets up a chronic disease, followed by thickening and increase of density of the part attacked. Actinomycosis is seen chiefly in the ox, but cases occur also in the horse, pig, and man. Often the lesion, which is confined to the seat of the inoculation, breaks down or becomes invaded by pus-producing organisms which give rise to abscess-formation and subsequent suppuration. Occasionally the cow's udder is affected in this manner, in which case the disease may be conveyed to the human subject in the milk. But more commonly man owes his infection to the habit which some persons acquire of chewing straws or grass, which may be contaminated by

the fungus. In such cases infection follows in the same manner as indicated in regard to animals.

Ringworm.—A skin-disease due to certain varieties of moulds. It may affect any of the domesticated animals, but more frequently attacks the ox, horse, dog, or cat. The disease is easily conveyed by contact with affected portions of the skin, or by means of grooming-utensils, bedding, &c. A form of ringworm found in the rat and mouse is sometimes transmitted to cats. Children in turn may contract the disease by fondling an affected cat. The disease may be transferred from animals to man, but no doubt the majority of cases in the human subject arise from contact with individuals suffering from this complaint.

Bacterial Necrosis.—This is a disease common to cattle, sheep, and pigs. It is due to a specific organism termed the bacillus necrophorus, which attacks the extremities of the limbs, the skin, and occasionally the mouth and tongue, giving rise to local gangrene of the parts attacked. If inoculated, together with any of the pus-producing micro-organisms, into a cut or abrasion, it is capable of setting up a similar train of symptoms in the human subject. The disease, however, is not of such frequent occurrence among animals as to render the risk of human infection at all serious.

ANIMAL PARASITES COMMUNICABLE TO MAN FROM THE LOWER ANIMALS.

These include mange parasites and tapeworms.

Mange, or Scabies.—Each species of animal possesses its own variety of mite-causing scabies. Occasionally the mange parasite of the horse or dog may get on to the person and set up acute irritation. The mites from animals will not, however, continue to live long on man. They either die, or more frequently leave their temporary host in search of the species to which they properly belong.

Beef-measles.—The ox is sometimes the host of the cystic or hydatid stage of one of the species of tapeworm infesting man, the so-called "unarmed" tapeworm (*Tænia inermis*). The eggs of the tapeworm voided by man are picked up by cattle when grazing. The embryos developed from the eggs penetrate the wall of the bowel, and pass to certain muscles, principally of the cheek and mouth, where they become encysted, forming small, bladder-like bodies about the size of a split pea. If the flesh of cattle affected in this manner be consumed in an uncooked or imperfectly cooked condition these embryonic worms develop in the intestine of the human subject into mature tapeworms.

Pig-measles.—The pig also may be the intermediate host of another tapeworm of man, the armed tapeworm (*Tænia solium*). The pig becomes infected in the same manner as in the case of the ox. The small cysts are found in the muscles of the pig, especially in the region of the tongue and heart. Should the underdone or uncooked flesh of pigs containing these cysts be eaten by man, the individual becomes the host of the mature tapeworm.

Echinococcosis.—This is by far the most serious and therefore the most important parasitic disease in New Zealand capable of being conveyed from the lower animals to man. It is the disease usually described as "hydatid disease" of the human subject. The hydatid cysts may develop in various organs and the bones of herbivora, pig, and man. They sometimes attain a large size, and destroy the normal structure by pressure. The cysts represent the bladder-worm stage of a tapeworm of the dog (*Tænia echinococcus*). This tapeworm is remarkable as representing the smallest known species. The worm is composed of three or four segments, the entire length being only about ⅛ in. For this reason it is frequently overlooked when search is made for it in the intestine of the dog, nor can its presence be detected readily during the life of the animal. The dog becomes infested through devouring portions of the flesh or organs containing the hydatid cysts in the bodies of any of the herbivorous animals or pigs. Thus the disease is much more prevalent in countries largely devoted to pastoral industries, such as New Zealand, where sheep-dogs are habitually fed on raw offal. For human infection the eggs of the tapeworm voided by the dog must become attached to the food of man or contaminate the drinking-water. People, and especially children, should therefore be warned against drinking indiscriminately from streams or creeks which are liable to be contaminated in this fashion, also to avoid eating watercress and salads unless these are grown in some situation inaccessible to dogs. Great care also should be exercised to prevent dogs licking the face or hands of children, who may thereby run a risk of becoming infected with hydatid disease should the dog happen to be the host of this particular worm. In passing I may remark that it has recently been shown that the ordinary house-fly can distribute the ova of *Tænia echinococcus* upon the food of man should it previously have fed upon excrement containing the eggs of this parasite.

PREVENTION.

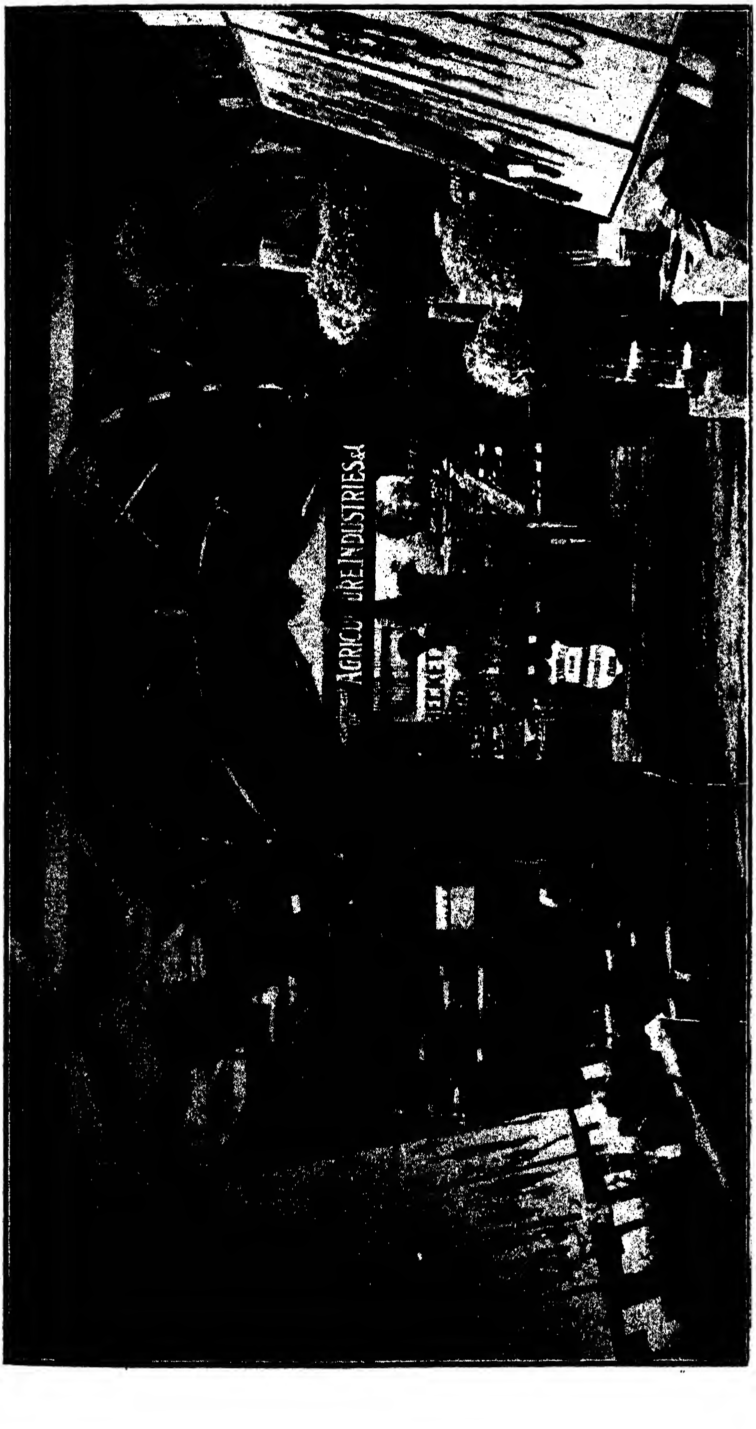
To prevent the transmission of diseases communicable from the lower animals to man it is necessary to guard the routes of infection. Our first defence therefore is provided by quarantine regula-

tions, which enact that animals imported into this country from abroad must undergo a period of detention in quarantine, where they are kept under surveillance before finally being brought on to the mainland. During this period any infectious disease which such animals may have contracted prior to shipment will have developed and given rise to noticeable symptoms. Moreover, in the case of cattle, unless accompanied by a veterinary certificate stating that they have been submitted to the tuberculin test prior to shipment and found free from tuberculosis, these are tested with tuberculin on arrival in New Zealand. Horses are tested with mallein in order to ascertain whether they are free from glanders, an exceedingly dangerous disease peculiar to equines but communicable also to man. Fortunately, this disease does not exist in New Zealand.

The Slaughtering and Inspection Act passed in 1900 ordains that all towns of not less than two thousand inhabitants must establish public abattoirs for the purpose of the slaughter of stock destined for human consumption. At each of these abattoirs a properly trained and qualified Inspector examines the carcase and viscera of every animal killed, allowing to pass into use only such as appear quite free from disease. In the case of the larger meat-export works veterinary officers are appointed to act in a similar capacity. The Act is administered by the Live-stock and Meat Division of the Department, and the entire system is supervised by legally qualified veterinarians.

Further precautions are assured by the services of Government Veterinarians and Inspectors of Stock, who include among their duties that of the examination of animals on the farm. They have powers, if need be, to destroy any animal suffering from diseases dangerous to health, in which case the owner is compensated, within certain limits, for the loss of the stock condemned.

Although I have by no means exhausted the subject of diseases communicable from the lower animals to man, I think that enough has been said to demonstrate the importance of a clear conception of the risks to which we are to some extent exposed, and the necessity of maintaining an adequate supervision of our food-supply. Thanks to the measures already alluded to, we are in a position to rest assured that, generally speaking, the inhabitants of this country are efficiently protected in these respects, while consumers of New Zealand meat abroad may feel confident that nothing leaves our shores which has not been subjected to the most rigorous inspection and is guaranteed free from disease.



THE DEPARTMENT'S EXHIBIT AT THE PALMERSTON NORTH WINTER SHOW.

Central portion of the display.

WEED - CONTROL.

THE SCIENTIFIC ASPECT.

A. H. COCKAYNE.

UNDER natural conditions no plant of any kind can be looked upon as a weed. In such circumstances the mastery of one plant over another, and of one type of vegetation over another, is only a natural sequence occurring through the aggressive plant or aggressive type being more suitable for the existing conditions of the locality than were the previously dominant types of the vegetation. This replacement that is continually occurring in nature must be caused through some modification in the action of the factors that influence plant-growth. These modifications may be caused either externally through an increase or decrease in the intensity of one or more of the factors uninfluenced in any way by the vegetation, or internally by a change brought about in their action through the direct influence of the vegetation during the course of its development. Any modifications in the factors influencing plant-growth will, under natural conditions, only take place slowly, and especially will this be true with external changes. Internal changes may, however, operate fairly rapidly, and in such cases the vegetation must be looked upon as a temporary one, liable to rapid replacement.

Associations of plants that are liable to be replaced through the growth of the individuals altering the existing conditions for plant-growth may be looked upon as instable associations, and those types that do not alter the conditions and are not liable to be replaced can be termed stable formations. Thus invasion, replacement, and migration of plants can, under natural conditions, be looked upon as the occupying of the land by those plants which individually and collectively are best suited to the conditions, and there is no sense of desirability for any special plants so far as the land itself is concerned. As soon as the land is occupied by man and utilized for any specific purpose there arises the desire to grow certain plants to the exclusion of others, and those that are not desirable from the personal aspect are termed weeds. Whenever undesired plants grow freely in any locality it is evident that their requirements are more perfectly attuned to the conditions than are those of the desired plants. The whole

object of soil-utilization is to grow successfully only those crops that are required to the exclusion of all other plants. When the conditions are unsuitable for the development of certain plants their culture has either to be abandoned or else the conditions must be artifically modified to adjust them to the requirements. Where the requirements are equally suitable for the development of both the required crop and for weeds, and they cannot be modified so as to render them unsuitable for the development of the latter without injuring the prospects of the required crop, then special methods for the mechanical removal of the weeds become necessary. This necessity, of course, becomes greater in proportion to the increase in the conditions favouring the development of the weeds over those favouring the plants that it is desired to grow. The principles governing natural replacement through internal modifications are well illustrated by crop rotation, where the growing of one crop should in all cases improve the conditions for the succeeding one; and when this method of farming is properly carried out the suitable conditions for the development of undesired plants are largely eliminated, and the weed question naturally becomes automatically controlled.

Under natural conditions pure associations consisting of one species are not unusual in certain cases, but they generally modify the conditions for plant-growth, and in consequence are less stable than are those consisting of a large number of species. Here the modifications caused by one species are often counterbalanced by those changes exerted by other species, and the struggle is largely one between the different components, leading either to an equilibrium or else to a comparatively pure association when the conditions favour the development of one species over any of the others. When this stage has been reached the stability of the association becomes considerably lessened, and quite a new type of vegetation is likely to become established. In pure associations that are not properly closed—*i.e.*, the limit of the individuals that the ground can support has not been reached—new plants which are as suitable for development as that species which is already dominant may enter into competition. In ordinary farming a great deal of the land is given over to growing pure associations which are naturally unstable, and in very many instances they cannot be looked upon as closed. In consequence of this, invasion by undesirable plants is the universal rule on land devoted to agriculture. The intensity of the invasion is in all cases directly correlated with the degree of suitability of those conditions favouring their development.

Wherever artificial conditions are introduced by man they should in all cases be such as favour the development of the plants that it

is desired to grow, as otherwise they must increase the difficulty of reducing the growth of the undesired elements to a minimum, and thus intensify the weed problem. The effects of man's operations, the utilization of land, must only be looked upon as altering existing conditions vastly more rapidly than can unaided nature and in those special directions that are necessary for the successful production of crops. The primal principles that govern natural invasion and replacement must be the same as those which operate in what may be termed artificial invasion and replacement. The study, therefore, of the behaviour of the plants under natural conditions should assist very largely in determining the factors which have to be controlled at will to avoid and control the invasion of farming-land by undesirable plants. It is thus seen that in the control of weeds the determining of how to alter the factors that influence their spread is really of much greater influence than the mere adoption of mechanical methods for their partial or total removal, although these may be the only practical ones to adopt in many individual cases where the weeds concerned show a great range of adaptability for varying conditions.

DISTILLATION OF HERB-ESSENCES.

A POSSIBLE INDUSTRY.

SEEING that several herbs, notably peppermint, will grow luxuriantly in uncultivated spots in New Zealand, inquiry was made of Mr. R. J. Drewitt, who cultivates this herb on a commercial scale in Dorking, Surrey, England. The following particulars have been kindly furnished by Mr. Drewitt for the benefit of readers of the *Journal of Agriculture*:—

We grow the black variety, which is better known than the white, though the distilled essential oil from the white is more valuable, the yield per acre, on the other hand, being less. It grows well in medium or light loam or on limestone ground.

The ground is cultivated to a good tilth, and when not too dry 43,560 plants per acre are dibbered in. Once growth has begun the land must be kept scrupulously clean, as any weeds allowed to grow taint the oil. The ground is dressed with shoddy, 6 per cent. ammonia, and farmyard manure. It is doubtful if this would be necessary in a virgin country like New Zealand. The dressing is hoed in.

Harvesting is carried out just after blooming, and it should be remembered that the leaves (not the stem) contain most of the essential oil. It is cut by hand, a knife similar to that used by cooks being employed. When cut it is laid on the ground to dry. After drying it is put into coconut-fibre mats, and at this stage one is practically independent of weather-damage, but on no account must the herb be matted when damp. The patent still to extract the oil is the last stage.

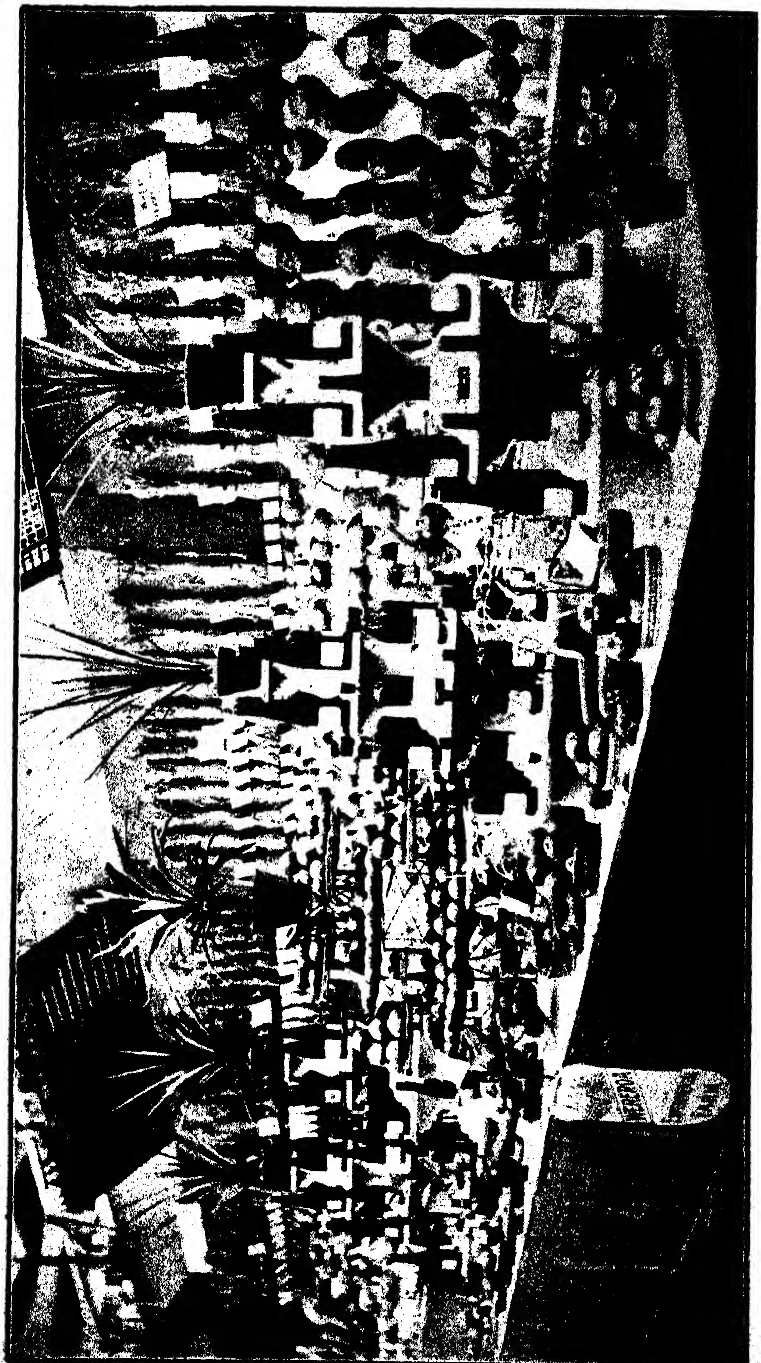
The one planting lasts from six to seven years in England. After harvest the plants are ploughed in 4 in. to 5 in. deep. In the spring the mint reappears, and light harrows are then run over it two or three times. Harrowing must be discontinued after the mint is 2 in. to 3 in. high, and the hoe again requisitioned for cleansing purposes. On no account must the soil be worked when it is damp.

To give an idea of the financial result the returns from my last crop were as follow:—

	£	s.	d.
20 acres area yielded 422 lb. of essential oil, at £1 7s. per pound	569	14	0
Plants cost £9, planting £30; spread over six years, say	7	0	0
Hoeing	40	0	0
Ten loads farmyard manure	2	10	0
1 ton shoddy	2	15	0
Soot (for ammonia), 40 bushels per acre, at 5d.	16	13	4
Harvesting	50	0	0
Distilling	60	0	0
	£178	18	4

It is doubtful whether plants would require anything more than a top-dressing of soot or some form of ammonia in New Zealand, or whether the plants would require renewal for the first fifteen years.

[If the cultivation of peppermint were taken up in New Zealand on a commercial scale, it would be necessary at first to strip the dried leaves and bale these, or bale the plants entire, and export to British distilleries. Should any considerable quantity be grown no doubt a Home firm would establish a distillery in the Dominion. In the event of the latter development the distillation of lavender, rosemary, and other aromatic herbs would follow as a matter of course. Many parts of New Zealand provide an admirable environment for the production of herbs of the description desired. Such an industry should appeal to women who favour a country life.—ED.]



THE DEPARTMENT'S EXHIBIT AT THE PALMERSTON NORTH WINTER SHOW.

The fruit display, and the roots and sheaves from co-operative experiments.

IMPORTATION OF FERTILIZERS.

B. C. ASTON, F.I.C.

A FEW brief notes on the more recent and at present little-known commercial fertilizers being imported into the Dominion will no doubt prove of interest to readers of the *Journal.*

Phonolite is a mixture of sanidine and nepheline, two minerals belonging to the silicate class and containing a proportion of potash. The meal as sold is said to contain 9 per cent. of potash, of which less than one-half (about 3 per cent.) is soluble in hydrochloric acid. As most potash manures are soluble in water, it will be seen that the importation of a potash compound which is not soluble in water is a new feature in the fertilizer trade of New Zealand. From the published results of field trials with the fertilizer in other countries it does not appear likely that it will prove efficacious on New Zealand soils.

Bernard's Phosphate.—This is a phosphatic fertilizer with 17 per cent. to 20 per cent. of phosphoric acid (P_2O_5), insoluble in water, but containing a large excess of caustic lime. It has yet to be proved as a fertilizer in New Zealand.

Gypsum, better known as "land-plaster," or sulphate of lime, is imported in considerable quantity from South Australia. As it does not act on other fertilizers and can be obtained in a granular condition, it is well adapted for mixing with fertilizers as a diluent or "filler." In addition to its best use in improving the mechanical state of fertilizers, it has a distinct value in liberating potash from the soil-silicates. It may be used as a source of lime where the addition of caustic lime may be inadvisable. It is also used for fixing the ammonia in stable-manure heaps.

Nitrolim, or calcium cyanamide, does not give promise of being largely used here, as it is a nitrogenous fertilizer—a class which is seldom required.

Sulphate of Iron.—The use of this fertilizer is increasing in the northern portion of this country, being mainly used in admixture with potato and other manures.

Jadoo is a fibrous material useful for potting in horticultural work.

Castor-meal is used occasionally as a nitrogenous fertilizer.

CAERPHILLY CHEESE.

MISS G. N. DAVIES, N.D.D.

CAERPHILLY cheese is a rather small, flat, round cheese, ranging from 7 lb. to 9 lb. in weight. It has a large sale throughout the mining districts of South Wales, and takes its name from Caerphilly, which is a village about six miles from Cardiff. It is usually sold and eaten when fairly new, or from four to five weeks after being made. During recent years quantities have been made in Ireland and have found a ready market in South Wales. Its sale, however, is not confined to this part of the country, as it is made and sold in various parts of England and Wales.

In making Caerphilly, as in all cheeses, especially those which are eaten new and in which little acidity is developed, particular attention should be paid to the milk used, and strict cleanliness observed in all operations. The general custom is to make this cheese from sweet, new whole milk, but it is sometimes made from two-thirds whole and one-third skim-milk.

METHOD OF MANUFACTURE.

Morning's milk is used, the acidity being 0·18 to 0·19 per cent.

Renneting.—The milk is regulated to a temperature of 84° to 86° F. according to the time of the year, and rennet added at the rate of 1 dram to every 3 gallons of milk, or 4 oz. per 100 gallons. The rennet should be diluted with at least three times its volume of water, and usually takes about twelve to fifteen minutes to show effect.

The time taken for coagulation is about forty to forty-five minutes, but the curd should be tested in the usual way with the finger or thermometer, and cut as soon as firm enough.

Cutting.—In cutting, both the perpendicular and horizontal knives are used, and the curd reduced to ½ in. cubes. The acidity should now be 0·12 per cent. The reasons given by Professor F. J. Lloyd for the acidity being less in the whey when the curd is first cut than in the milk at renneting are: The casein in milk is combined with lime, which to a certain extent is set free in the act of coagulation, and combines with the acid salts in the milk and partly

CUTTING THE CURD.

FILLING THE CURD INTO THE MOULDS.

neutralizes them; but all the lime is not liberated, for a large quantity subsequently separates from the curd; also some of the acidity of milk is due to the acid nature of the casein itself. This is called casein acidity. A little curd is taken out of the tap at this stage and put back in the vat. Allow the curd to stand for five minutes and then clean the sides and bottom of the vat, and afterwards stir carefully with the hands for ten minutes.

Scalding.—Scalding is now commenced and the temperature of the bulk raised to 88° F. to 92° F., stirring the while. The time taken to raise the temperature is forty to forty-five minutes. When the scalding temperature is reached, if the curd be not quite firm enough, it may be stirred a little longer.

Pitching.—Allow the curd to stand in the whey or "pitch" for ten minutes, after which the whey may be run off. The curd should be kept to the sides of the vat in order to drain well. Acidity at running off the whey should be 0·14 to 0·15 per cent.

Removal of Curd to Cooler.—The curd should now be shovelled on to the cooler or drainer, which has previously been lined with a curd-cloth, and left to drain for twenty to thirty minutes; then cut and turn every ten to fifteen minutes until the curd is sufficiently firm and dry enough to break up and vat, the acidity being 0·18 to 0·2 per cent.

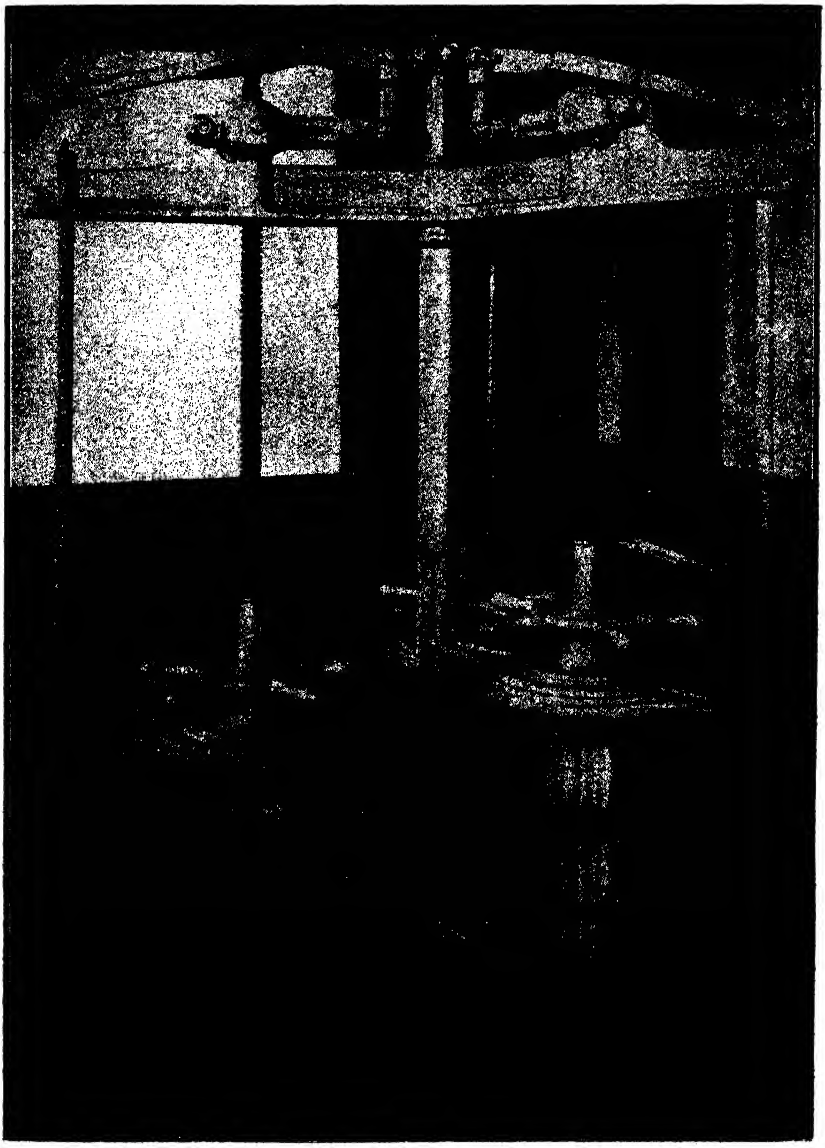
Vatting.—The curd is now broken into pieces the size of walnuts with the hands, but where large quantities are made a mill may be used, and salt added at the rate of 2 lb. to every 100 lb. of curd. This should be well mixed with the curd, which is afterwards filled into the moulds, which have been previously lined with coarse cloths. When ready for vatting there should be about 10 lb. of curd from every 5 gallons of milk.

Salting.—Some makers prefer to sprinkle the salt between layers of curd, whilst others salt from the outside. This is done by rubbing the salt on the outside of the cheese, the quantity being ½ oz. of salt to the pound of curd. The weight is taken the first morning.

Pressing.—After the curd has been filled into the moulds the followers are placed on top and the cheese left to drain for three or four hours. The cheese is then turned into a clean dry cloth and placed back in the mould, put in press, and 3 cwt. to 4 cwt. pressure applied. The next morning it is again turned and placed under 5 cwt. pressure, and the third morning, after again turning into a dry smooth cloth, 10 cwt. pressure is applied. The same afternoon or the following morning the cheese may be taken out of

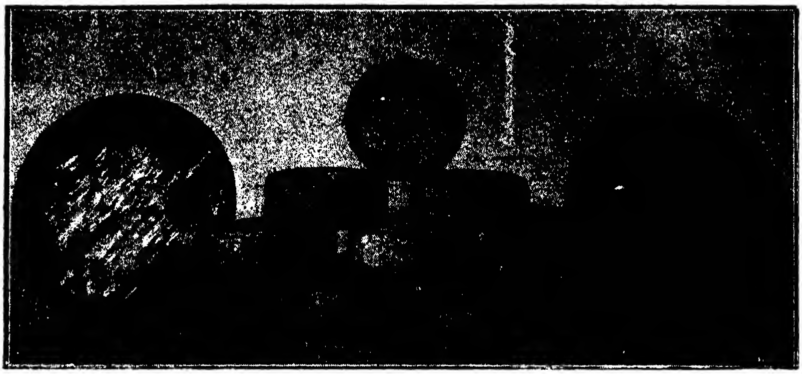
the press and placed on shelves, where they are turned and wiped daily.

Curing.—At the end of a week the cheese are washed outside with brine, consisting of 1 lb. of salt to a gallon of water, temperature 80° F. They are then removed to the curing-room and turned



Cheese in Press.

daily. The temperature of the curing-room should be 60° F. to 65° F. Brining on the outside is supposed to improve the coat and to help to dry the cheese.



CAERPHILLY CHEESE.

These cheese are sometimes sold in three weeks, but five weeks is preferred.

MILKING-MACHINES.

D. CUDDIE.

DURING the last decade, and more particularly during the last five years, the installation of mechanical milking-machines has been widely adopted in this country. A large number of the machines are now in operation throughout the greater part of the dairying season. The fact that many of the larger herds are milked by this means denotes that a larger quantity of milk is drawn by machines than the number of users would indicate.

Even before the advent of milking-machines some of the milk supplied to dairy factories was not produced under the best of conditions, and the addition of the milking-machine to the other utensils which have to be cleansed on the farm has not lightened the duties of the individual responsible for the washing-up.

While some dairymen are of such a temperament that they cannot brook anything that is dirty or unclean, and will see that even a milking-machine is kept in a condition compatible with the production of clean milk, we have evidence which goes to show that, unfortunately, this class is not as numerous as it should be. There are a number of dairymen who can keep an ordinary bucket or can looking fairly clean when the corners are easily seen, but

there are many such dairymen who are not equal to keeping clean the unseen corners of a milking-machine.

The large number of mechanical milkers now in use has had a distinct effect on the average cleanliness of the milk supplied to dairy factories. It has been generally recognized amongst the Dairy Instructors and factory-managers for some time that while the milk from some farms using machines is satisfactory the major portion is more or less depreciated through the change from hand to machine milking.

The unsatisfactory condition of the dairy-produce market this past season has made buyers more critical, with the result that complaints regarding quality have been more numerous than usual. Milking-machine milk has come in for its share of criticism in this connection, and the Dairy Instructors have therefore turned their attention more distinctly of late to the giving of instruction on the farms where these machines have been in use. The visits of inspection that have been made to the farms have confirmed the opinions of the officers regarding the detrimental effect of unclean machines upon the general purity of the milk, for in many cases the visit to the farm was preceded by the making of a curd test at the factory, the subsequent inspection at the farm being merely to locate the cause of the inferiority indicated by the test.

In carrying out this work during recent months the Instructors have inspected some 278 milking-machines, and their reports on these plants show that, so far as cleanliness is concerned, the extreme limits are far removed. While a few were so clean that there appeared to be room for no improvement, others were so dirty that notice for a general clean-up within a minimum of time had to be given.

Of the 278 machines inspected, 64 could be classed as clean, 75 as fair only, and 139 as dirty. These numbers correspond to the percentages of 23, 27, and 50 respectively.

The figures thus obtained would suggest that practically one-half of the milking-machines in use are contaminating factors, and are depreciating the value of the manufactured article. Much of the contamination produces gas in the curd in cheesemaking, causing openness in the body of the resultant product, a fault which has been more prevalent in our cheese of late years. The figures indicate a large field for work of improvement through educational means, and lower prices for inferior quality will doubtless force directorates of dairy companies to expect their managers to discriminate more closely in the quality of the milk received at the factories. Until a stricter classification of the raw material is more general, little good can be done on the farms.

TOMATO-DISEASES.

LOWER HUTT EXPERIMENTS.

T. C. WEBB, Jun.

EXPERIMENTS for the control of tomato diseases and pests have been carried out by the Orchards, Gardens, and Apiaries Division of the Department in co-operation with the Hutt Tomato-growers' Association. A glasshouse was leased for the purpose from Mr. A. Hobbs, of Lower Hutt. This house is 63 ft. by 23 ft. (inside measurement); it has boarded sides, the remainder of the structure being glass. There are two doors, one at each end, with a fan-light at the top of each. There are also eight bottom ventilators and a long top ventilator. For the testing of sprays, manures, and humidity the house was divided into eight plots. The following plan will give an dea of the plots, &c. :—

West.

South. | | | | North.

No. 4. Kainit. Sprayed with Bordeaux mixture.	No. 3. Garden manure. Sprayed with Bordeaux mixture.	No. 2. Blood and bone. Sprayed with Bordeaux mixture.	No. 1. Basic slag.
No. 5. Super., bone, sulph. ammonia. Sprayed with Burgundy mixture.	No. 6. Super., bone, nitrate of soda. Sprayed with A.C. copper.	No. 7. Sulphate of iron. Sprayed with A.C. copper.	No. 8. No manure. Sprayed with Cliff's fluid and Yel-Ros.

East.

PREPARATORY WORK.

The Department obtained possession of the house in the early part of January. The old plants, which had been badly affected with tomato-spot, Irish blight, and eelworm, were removed. After this the soil was dug up and raked over, and the whole house was

sprayed with Bordeaux mixture—10-10-40 formula. This could not be done very thoroughly, on account of a fruiting-vine running through the house. On the 1st February the plants were set out, wire pins being placed alongside each plant and a piece of binder-twine tied to a wire along the rafters and then to the wire pin. The plants were trained to grow around the twine to save tying. Under this system the plants are easy to get at for spraying, &c. The wire pin holds the lower portion of the plant quite securely.

SOIL.

The soil in the house had been planted in tomatoes four times during two years. The manures used were superphosphate at the rate of 17 cwt. per acre, and again at 8½ cwt. per acre, other special mixtures being used for different crops. Owing to the planting being so late, the replacing of the soil was left for next season; consequently the tests for manures could hardly be termed satisfactory, on account of the continual manuring and working of the soil.

PLANTS.

Some of the plants used were sturdy and strong, while others were very poor. This was, no doubt, due to the fact that the best had been used for the earlier planting. Two days after setting out, the plants received a good watering. They showed good growth and freedom from disease up to the 5th April.

SPRAYING.

All the plants on the west side of the house were sprayed with Bordeaux mixture—3-5-50 formula. The first spray was applied soon after the plants had been set out. One section of the east side was sprayed with Burgundy mixture, commonly known as "soda Bordeaux," which consists of 4 lb. of sulphate of copper, 5 lb. of washing-soda, and 50 gallons of water. The second section was sprayed with ammoniacal carbonate of copper, and the third section with Yel-Ros.

RESULTS.

The west side of the house was kept clean and free from disease up to the 5th April, the plants up to that date having been sprayed regularly every fortnight. Owing to other work occupying my time, three weeks elapsed before another spraying was applied. After this interval I found that all the plants had been attacked with tomato-spot (*Cladosporium fulvum*). I sprayed immediately with Bordeaux and apparently killed the disease. The

following week the disease reappeared, and continual spraying had to be resorted to. From this it will be seen how necessary it is that growers should spray every ten days. It is advisable to use a bend on the piping near the nozzle so that the spray can be delivered on the under-surface of the leaves. If thoroughly applied with a good force Bordeaux mixture is a certain preventive of fungoid diseases; but should the disease get a hold it takes a considerable amount of spraying to keep it in check. Hence the saying "Prevention is better than cure" is a good motto for the grower.

Burgundy mixture gave good results up to the 5th April. After that time it was useless. This mixture has not the lasting power of the Bordeaux mixture, and plants need to be sprayed with it more often, although the mixture is easy to make and does not leave a stain on the fruit.

Ammoniacal carbonate of copper could not be procured in Wellington or Auckland, consequently it was sent for to Dunedin, and arrived here too late for a trial. As an alternative, 1 oz. of carbonate of copper was employed for the solution. Difficulty was experienced in getting the copper to dissolve in the ammonia. This spray burned the leaves, turning them yellow. The mixture was again tried, this time the proportion of ammonia being decreased; but this was also useless, as the copper would not dissolve.

Yel-Ros: This is a new spray, and, in accordance with the policy of the Department, a two-years test is required before a report can be published.

MANURES.

As shown in the plan, the house was divided into eight plots. On the first appearance of fruit the plots were manured as follows: No. 1, basic slag, 3 oz. per square yard; No. 2, blood and bone, 1¾ oz. per square yard; No. 3, Gear's garden-manure, 2 oz. per square yard; No. 4, kainit, 1 oz. per square yard; No. 5, 1 oz. superphosphate, ¾ oz. bone, ¾ oz. sulphate of ammonia, per square yard; No. 6, 1 oz. superphosphate, ¾ oz. bone, ¾ oz. nitrate of soda, per square yard; No. 7, sulphate of iron, 2 oz. per square yard (for eelworm); No. 8, no manure.

As before stated, a reliable report could hardly be furnished as to the results of the above-mentioned manures, seeing that the soil had been repeatedly manured previously.

All the plants in plot 1 were sturdy, and bore clusters of fruit better than those of any other plot. No. 2 plot was similar in growth, but produced less fruit. In No. 3 the plants were weak

Root of Tomato-plant attacked by Eelworm.

from the start and never did much good. No. 4 was the same as No. 3, only with a few more clusters of fruit. No. 5 contained strong plants; the fruit never set on this plot. No. 6 had strong plants; the fruit was the first to colour in this plot. In No. 7 the plants were scorched with spray. No. 8 was the same as No. 7.

TEMPERATURES.

The maximum and minimum temperatures were taken daily at 1.30 p.m. Ground thermometers were placed at intervals between the rows in order to compare the top temperatures with those at the bottom. During the tests the climatic conditions were extremely changeable. The top temperature ranged from 48° to 94°. The ground temperature ranged from 48° to 76°. These temperatures were very low towards the latter end of the season, owing to the severe frost experienced.

HUMIDITY.

Testing the humidity of the atmosphere was carried out with the aid of Lloyd's hydrodeik, which was described by Mr. Reid in the *Journal* of the 15th March, 1913. The average humidity for the season was 72°. This I consider is far too much, and was the cause of a lot of plants producing trusses of fruit which never set. This is a most important matter, and growers will need to pay more attention to this subject. With the experienced grower the matter is not so difficult, because on entering the house he knows at once if there is too much moisture or heat, and regulates the ventilators accordingly.

DISEASES.

Eelworm.—The photographs shown give a fair representation of what came out of each plot, and will give the reader an idea of how badly the plants were attacked by eelworm. Carbon bisulphide, sulphate of iron, kainit, and Cliff's fluid were used to check this pest; but all proved useless.

Tomato-spot.—This disease is easily controlled by spraying with Bordeaux mixture. Several growers when spraying never think of the under-surface of the leaves and spray only the top. This disease starts *under* the leaves, with white, velvety, round patches which gradually get larger, ultimately breaking through on to the top of the leaf and causing large brownish patches. From this brief description it will be seen it is absolutely essential that the spray should reach the under-side of the leaf.

ROOT OF TOMATO-PLANT ATTACKED BY EELWORM.

Black-stripe.—There were two plants affected with this disease. No. 1 was thoroughly sprayed all over and around the roots with Bordeaux mixture. This improved the appearance of the plant considerably, and the black markings disappeared; but in two weeks' time the stripe appeared higher up. No. 2 plant received a liberal dressing of lime around the roots, at the suggestion of Mr. Howard, secretary of the Hutt Tomato-growers' Association. The plant acted in the same manner as No. 1. This coming and going is so characteristic of the disease that the test is nothing to go by.

White-fly.—On the 7th April white-fly made its appearance and gradually increased in number, causing a black sooty excretion on the leaves and fruit. This disease causes the fruit and the plant to wither and then die. McDougall's fumers were used with very good results, killing thousands of flies. The fumers are very simple to arrange, and I can recommend them to any grower troubled with this pest.

It may be mentioned that the house was open to all visitors taking an interest in the experiments. To enable information to be secured each plot was marked with all details. The lease of this house does not expire until the end of the year, thus affording the opportunity of conducting further experiments, a report upon which will appear in due course. Thanks are due to Mr. Hobbs for his assistance.

INTERNATIONAL INSTITUTE OF AGRICULTURE.

HONOURING THE FOUNDERS.

DURING the first European sitting at Rome of the Commission appointed by the American Government to investigate European systems of agricultural co-operation and farmers' credits (says the *Spokesman Review*) the members presented a silver loving-cup to Mr. David Lubin, of Sacramento, California, the gentleman who first presented the scheme for the foundation of the International Institute of Agriculture to the King of Italy. Mr. Lubin declined to accept the gift, saying that all the merit for the success of the institute was due to its President, Marquis Rafaele Cappelli, and therefore the cup should be given to him. Marquis Rafaele Cappelli said he would take the cup not for himself, but for the Institute.

PREPARING MINERAL OIL FOR SPRAYING.

A MODIFICATION IN THE USE OF SOFT-SOAP.

A. H. Cockayne.

During the past few years winter spraying with mineral oils for the suppression of many sucking insects which appear to be controlled most easily during that season of the year has become very general in the orchard districts of New Zealand. This is especially true of all apple-growing sections of the Dominion where any of the scale insects or American blight are at all in evidence. The mineral oil that has secured fairly general adoption is one or other of the grades of the so-called red lubricating machinery-oils. These oils for spraying are generally procured in a condition denaturated with the admixture of a definite quantity of resin, thus avoiding the duty levied on similar oils that are not denatured. The oil requires to be emulsified by the grower before being applied. There are a number of proprietary compounds largely composed of mineral oils that are so prepared that they are immediately ready for applying so soon as the necessary amount of water has been added. For my part, I especially favour the use of these prepared oils, provided they mix easily and uniformly with water and do not develop any free oil on the surface. There appears to be a prevalent idea that an oil is not effective if it does not thoroughly grease the tree and leave it in that condition for several weeks. As oils are supposed to kill insect-life almost immediately, I cannot see the object of having the trees covered with a distinct oily coating for many weeks, and thus interfering with the normal functions of the bark. Again, trees that have been sprayed with an oil spray that leaves the trees oily for a considerable time are difficult to spray with Bordeaux, and this is a point worth consideration.

A great many growers prefer to prepare the mineral oil for spraying themselves, and for this purpose soft-soap is nearly always used as the emulsifying agent. The following modification in the method of using soft-soap is suggested, having been found to be very satisfactory in a series of experiments that I have recently carried out:—

Dissolve 4 lb. of soft-soap in 4 gallons of red oil by heating over a fire. The soft-soap dissolves in a very few minutes—in a

much shorter time, indeed, than is necessary for the boiling of water. When the soft-soap is dissolved put both delivery and suction ends of the spray-pump hose into the oil and work the pump steadily, at the same time pouring in slowly 2 gallons of cold water. Then dilute to the required strength. A very satisfactory emulsion is thus secured, far more rapidly than by the ordinary method. The great advantage of this modification is that a large quantity of oil can be dissolved with the soft-soap and can be put aside until such time as it is required. When spraying is to be done the prepared oil should be stirred well and the necessary amount put into the spray-tank, when, with the aid of the hose and pump, an emulsion can be made rapidly. In general, half a gallon of water will turn each gallon of oil into a satisfactorily thick emulsion. The great advantage of this simple modification on the ordinary method is that no time is wasted at the time of application by having to heat water.

PASTURES:

INFLUENCE OF MANURES ON THEIR FEEDING-VALUE.

PRIMROSE McCONNELL.

AN experiment to determine the influence of manures on the feeding-value of pastures was commenced at Ruakura Farm of Instruction in June of last year (1912), and, there being considerable variance of opinion as to the value of the various phosphatic manures for top-dressing purposes in the district, the experiment should ultimately prcve of considerable value to farmers in the Waikato. The paddock chosen for the purpose had for some years previously been well manured and cultivated throughout the general cropping rotation, and on this account it was not expected the manuring would give a profitable return the first year of the experiment, as it certainly would have done on a worn-out pasture. The experiment will be doubly interesting from the fact that it will show how soon the "no-manure" plot becomes exhausted.

When the experiment commenced the percentage of grasses over the whole paddock was as follows: Cocksfoot, 17 per cent.; rye-grass, 20 per cent.; meadow fescue, 3 per cent.; sweet vernal, 1 per cent.; Yorkshire fog, 2 per cent.; crested dogstail, 2 per

cent.; *Poa annua*, 1 per cent.; white clover, 34 per cent.; red clover, 14 per cent.; trefoil, 1 per cent.; weeds, 5 per cent.

It will be interesting to note each year whether there is any variation in the herbage as a result of the top-dressings.

The area of each plot is 2½ acres. The sheep were weighed monthly, or as near monthly as weather-conditions would permit. Wethers were used in the experiment, and several lots were got off fat during the year. The following table shows the results for eleven months only, for the reason that during the twelfth month the plots were chain-harrowed and rested. For the first two months of the experiment the no-manure plot gave a greater gain than any of the manured plots, showing that the manuring, which was carried out a month before the sheep were put on the plots, had some detrimental effect in the initial stage. It should be borne in mind that an experiment of this kind requires to be carried on for several years before reliable deductions can be drawn.

Plot.	Top-dressing applied per Acre.	Cost per Acre.	Live-weight Gains per Acre.	Total Financial Gain per Acre on the Basis of Two-thirds of the Live-weight Gain at 3½d. per Pound.	Loss per Acre by Manuring.	Average Number of Sheep carried per Acre.
		s.	lb.	£ s. d.	s. d.	
1	5 cwt. basic superphosphate	24	853·6	8 6 0	17 11	6
2	5 cwt. basic slag ..	23	853·2	8 5 9	17 2	6
3	No manure	..	822·8	7 19 11	..	6
4	5 cwt. superphosphate	24	915·2	8 18 0	5 11	6

At the Ruakura Farm of Instruction about 50 acres have recently been sown with the Ruakura rust-resistant oat. The sowing was done under good conditions. A further area will be sown as soon as it is prepared.

At the Ruakura Farm of Instruction 1,600 tons, or something like 3,000 loads, of roots are being carted off or are to be carted off in connection with experimental work at the Farm.

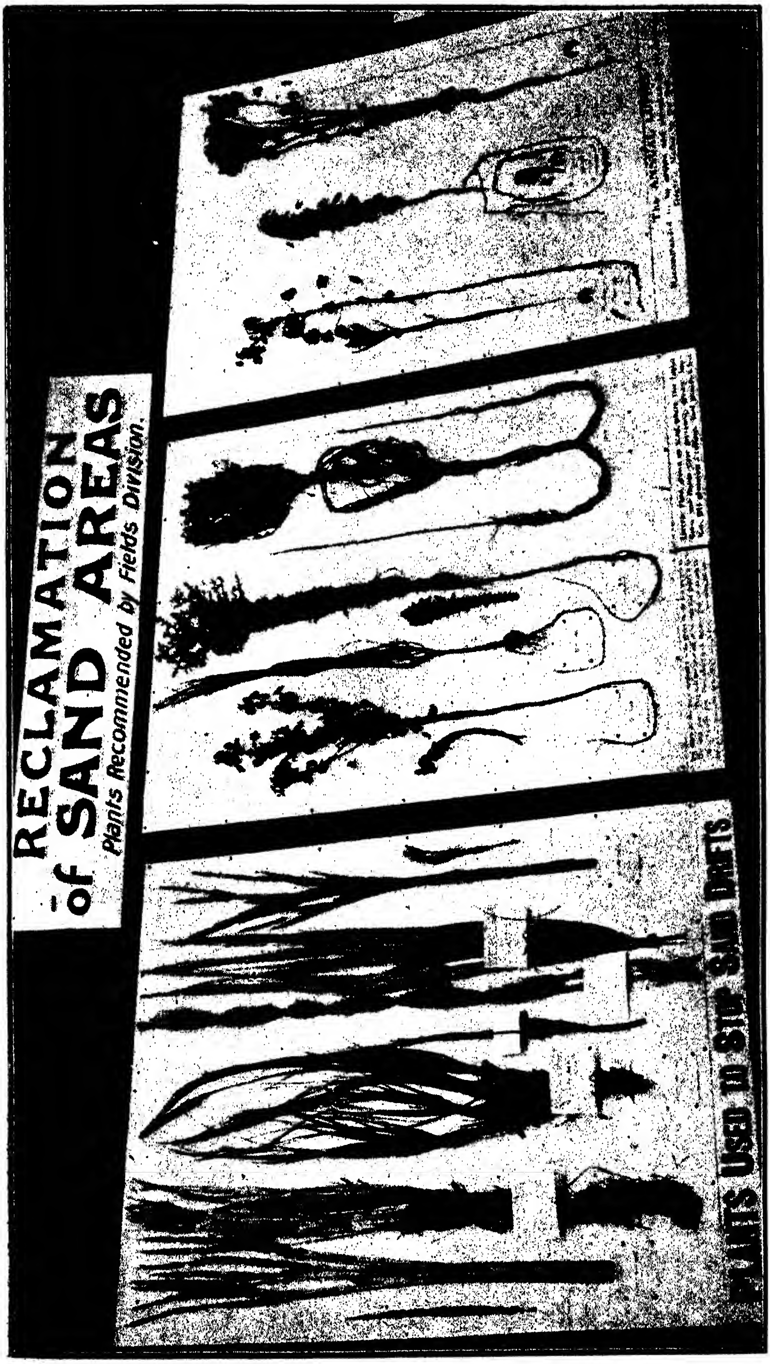
EVERY weed takes the place of a useful plant, and in direct proportion to the number of weeds present is the carrying-capacity of the land reduced.

RECLAIMING SAND AREAS.

IMPORTANT work is being carried out in the South Island by the Fields and Experimental Farms Division of the Department in the reclamation and the utilization of sand areas. The procedure which had been found most successful in checking drifting sands by settlers in the South was the use of marram-grass and sea-lyme grass, and the sowing in the sand, on the land side, of tree-lupin, gorse, and broom—three members of the legume family. These not only add nitrogen to the sand, but, by reason of the foliage they shed and their decayed stems and roots, they provide the desired organic matter, and humus is thereby created. A further stage in the work of reclamation was introduced by the Department. This consisted of cutting down the tree-lupin, broom, and gorse when these had served their main purpose of binding the sand, and planting on the improved area the annual lupins—the white, blue, and yellow—and ploughing these in when about four months old. The burying of the heavy foliage and roots adds a large amount of organic matter to the sand, while the nitrogen-content is further increased.

It has already been demonstrated that lucerne will flourish well after the tree-lupin, gorse, and broom have been removed, and potatoes, carrots, and parsnips have also done well. Ryecorn has been grown with equal success. With the introduction of annual lupins (for which the Fields and Experimental Farms Division of the Department is responsible) and the growing and ploughing-in of these a simple solution for the utilization of sand areas is presented. The process, it has been conclusively proved, will gradually convert the shifting sand into a sandy loam capable of retaining moisture and of growing leguminous crops, the persistent cultivation of which under such conditions must undoubtedly quite transform the character of the sand and convert it into a valuable plant-growing medium. The plants employed in the South Island experiments (which are to be continued and extended) are pictured on the following page as they were exhibited at the recent winter shows.

In pot experiments initiated to determine the cause of the almost sterile nature of some of the soil of the Ruakura Farm of Instruction it would seem, reports the Manager, that the want of sufficient lime in the soil is one of the main causes of sterility.



Plants used to stop sand-drifts. Lucerne-plants grown in sand. The annual lupins.

THE SAND-RECLAMATION EXHIBIT OF THE DEPARTMENT AT THE WINTER SHOWS.

STANDARDIZING INSTRUCTION-WORK.

THE field officers of the Orchards, Gardens, and Apiaries Division were recently brought together in Wellington by the Director of the Division, Mr. T. W. Kirk, F.L.S., for the purpose of discussing with himself and the Assistant Director, Mr. W. A. Boucher, means of bringing about greater uniformity in methods of imparting instruction and standardizing instruction-work.

FRUIT INSTRUCTION AND INSPECTION.

The officers engaged in orchard instruction and fruit inspection considered, among other subjects, amendments which the practical working of the Orchards and Garden Diseases Act of 1908 showed to be desirable in the interests of the industry. After thorough discussion a number of suggested amendments were unanimously agreed to. These will be duly submitted for approval. The subject of packing fruit, especially for export, was very fully discussed.

Practical demonstrations were given illustrating the advantages claimed for particular methods and particular cases. As a result it was shown to the entire satisfaction of the Conference that one of the cases submitted by officers possessed several distinct advantages over the case now in use. (1.) It was admitted by the Instructors from British Columbia and Tasmania who have recently joined the staff that the case was much more easily packed than the Tasmanian case (now generally in use in the Dominion). (2.) It was shown that fruit would be less liable to bruising. (3.) On the case being submitted to the representatives of the shipping companies it was declared that twenty-five cases would go to the ton measurement instead of twenty-three as at present, this meaning a saving, roughly, of 6s. on the freight of each twenty-five. (4.) Telegraphic quotations from case-manufacturers showed that the price will be £2 12s. 6d. per hundred cases, in shooks, f.o.b. on rail. (5.) The case would still hold an imperial bushel of fruit. It is intended by the Division to demonstrate the advantages of this case to the Dominion Conference of fruitgrowers to be held in September.

A set of suggested regulations to govern the compulsory grading and packing of fruit for export was drawn up, the object being

to establish standard grades of New Zealand fruit on oversea markets, and to ensure that nothing but good fruit shall leave the Dominion.

Methods of controlling plant-diseases, inspection of orchards and shops, and testing spraying-materials and fertilizers were exhaustively discussed by the Conference.

APIARY INSTRUCTION AND INSPECTION.

The four apiary instructors also met the officers in charge in Wellington to discuss matters in connection with their particular work. Regulations to control the grading of honey for export were discussed, and some amendments suggested. It was considered advisable to establish four grades of honey for export. The instructors also recommended some slight amendments to the Apiaries Act which would be to the advantage of the industry.

SYSTEMATIZING INFORMATION.

Opportunity was taken at both Conferences of the presence of the instructors in Wellington to have a joint revision of the bulletins and leaflets which are at present out of print, in order that there may be unanimity of opinion among the field instructors on every detail of the methods advocated in the literature of the Division.

PEAR-SCAB.

T. W. KIRK, F.L.S.

A LOCAL appeared in the *New Zealand Farmer* in February, 1911, stating that pear-scab had been cured by the application of from 4 lb. to 6 lb. of washing-soda to the soil around the affected trees.

The Director of the Fields and Experimental Farms Division was asked to arrange for tests to be carried out at the Waerenga Experimental Farm. This was done. Following is the report of the Manager: "Four trees were treated as per your instructions, but no marked difference has been noted so far between the trees treated as subject to pear-scab and those untreated. Possibly the action of the soda may have some bearing on the roots of the trees during the coming season."

GLADYS II.

THE three-year-old Holstein heifer Gladys II, of the herd of Mr. G. Aitchison, of Kaitangata, which Mr. W. M. Singleton announced in the May *Journal* as having distinguished herself by having produced her requirement to qualify for a semi-official test in the shortest period of any cow of any class, has now completed her milking-period. Her record for 304 days' milking is 15,788·25 lb. of milk, testing 3·88 per cent. and giving 614 lb. of butter-fat. Her daily

average was 51·93 lb. of milk and 2·01 lb. of butter-fat. Unfortunately, the heifer could not be milked for the full period of 365 days which she was entitled to under the conditions governing semi-official testing. She will be practically five months earlier than she might have been in this next freshening. Had she not been served so early in her testing-period it is not improbable that she would have established a world's record for her class.

Domino V.—This grand-daughter of Domino III, the champion cow of the Holstein Herd of the Weraroa Experimental Farm, is an excellent type of a dairy cow. As a heifer (in the 1910–11 season) she gave 11,249 lb. of milk and 404·9 lb. of butter-fat; in the 1911–12 season 14,582½ lb. of milk and 481·223 lb. of butter-fat, and for 167 days of the 1912–13 season (up to 30th June) 8,786 lb. of milk and 276·37 lb. of butter-fat. At the end of June she was still giving 37 lb. of milk a day. Domino V is by Kruger II out of Domino IV (a daughter of Domino III by Kruger). Her picture forms the frontispiece of this issue.

NATIVE PLANTS.

THE WORK OF COLLECTION AND ESTABLISHMENT.

W. H. Taylor.

A HAPHAZARD way of collecting plants from the bush or other habitats seldom meets with success. If collecting in a large way be intended, proper methods should be adopted in securing the plants, and means provided at home for their treatment when they arrive. Even if only a few plants be gathered on occasions when collecting plants is not the object, they still require the same care. One occasionally sees people returning from a picnic carrying young nikaus or cabbage-trees with the roots exposed to the air; consequently the plants are practically dead before they reach home. Plants growing in the bush are in a cool conservatory, where drying winds or the glare of the sun never reach them. Sudden exposure to either means death to the plants.

The handiest way to collect is to carry a kit—a sugar-bag with the mouth sewn up, one side ripped open, and a rope handle put on each side, makes an excellent kit for the purpose. Plants chosen should be small, for, as they are all seedlings and have never been disturbed, they will either have a taproot or their roots will ramify considerably. If they have gained some size, there will necessarily be so much mutilation of roots that there will be little chance of getting them to grow. There are exceptions in which these remarks do not apply, but they apply generally. It should be noted that bush seedlings are usually started in leaf-mould lying beneath the trees. The roots, of course, get through the leaf-mould and into more solid ground after a time. If the plants be secured before they are firmly attached to the solid ground they may be taken with very little injury to the roots. These are the best plants to take. My own plan is to reject any plant that does not come away with a slight pull. However much I may want a plant, I do not take it if I have to mutilate the roots to get it. I never dig a plant in the bush. It is, indeed, very difficult to do so, on account of the network of tree-roots.

As soon as collecting begins put a little damp bush moss in the bottom of the kit, and lay the plants on it. If many of a kind are gathered in one spot it is best to tie them in bundles with

moss tied around the bunch of roots. In the bush there is always tying-material which will answer a temporary purpose. Before leaving the bush it is wise to empty the kit, sort out the specimens, and tie the roots of each up in moss as indicated above, for after reaching home it is not probable that they will be further attended to until next day, or at least for some time. If so protected and left in the kit they will not be adversely affected.

Most bush plants are easily grown, some more easily than others. The rewarewa (honeysuckle) is rather unkind. Take only quite small plants. They make one strong taproot, with few others, and will not survive mutilation. Matai and rimu are usually found on rather hard ground—that is my experience—and only small plants can be removed successfully. The first important steps, then, are to secure plants with very little mutilation of roots, and to protect effectually both root and top from drying influences till you reach home.

RE-ESTABLISHING THE PLANTS.

The plants have come from positions where they have shade, perpetual moisture in the atmosphere, very light soil, and, in most cases, perfect drainage. If these conditions, or any of them, be suddenly reversed most of the plants will die, whereas very simple precautions will preserve almost every plant that is taken as described above. It will be observed that most of the roots of young bush plants are barely covered with mould, some are quite in the air—with a moist air, however—but are shaded. If the plants when taken from the bush be at once planted in soil, most of them perish. The first step to success is to induce the formation of new roots by instituting conditions as near as possible to those they were previously subject to.

For my first acquaintance with the most simple means of rooting these plants I am indebted to Mr. H. H. Travers, F.L.S., who pointed out to me that plants have a strong affinity for sphagnum moss and that almost any plant will grow in it without soil. This statement I have fully proved to be right. As sphagnum is within the reach of most people I will describe its use first. Sphagnum is the moss that grows in swamps, forming small hillocks or clumps. It has several peculiar properties: it never gets mouldy, it never heats, and its decay is remarkably slow. Bush moss is quite unsuitable, as it perishes quickly in most instances, and has not the vivifying properties of sphagnum. The way to deal with the plants is to take a small handful of sphagnum; open the hand to let the moss spread; lay the roots of a plant on the moss; close the hand and squeeze the moss tightly around the roots. Then take a

narrow strip of flax or raphia and bind the moss together rather tightly. The plants may be laid aside in sorted piles till all are mossed. The next step is to put them in boxes. The boxes may be lined with sphagnum with advantage, but this is not very important. The description of box should vary somewhat according to the position in which they are to be placed. This will be explained further on.

A SIMPLE SHADE-HOUSE.

Any one desirous of making a hobby of cultivating native plants will find that very simple means render the successful growing of a large number of species quite easy, and the pastime becomes a very pleasurable one. Shade may be provided at little cost. A framework of rough scantlings and battens lightly covered with branches of manuka wired on will be as good as anything. The manuka must be close enough to provide shade, but not thick enough to make the house dark. At the time the house is constructed climbing-plants should be started round it, so that their growth may take the place of the scrub when it falls away through decay.

One may digress for a moment from the main subject to say that the native clematis, passion-flower (*Passiflora tetrandra*), and jessamine (*Parsonsia heterophylla*) would make excellent covering and support the native character of the house. The native clematis is commonly supposed to be difficult to transplant. It is really very easily moved, the extraordinary thing about it being that it moves best when in flower.

Any one having a shade-house may put the mossed plants in just such boxes as are used to raise seedlings. Begin at one end and pack the plants tightly together; fill any spaces left with sphagnum, also pressed tight. The moss should be moist when used. The stock of it should be kept out-of-doors in a shady corner where it will always be moist and will keep alive. In the absence of any shade-house it will be best to use deep boxes, the sides of which will afford shelter. Stand them in a sheltered place. The use of scrim as a shelter may be advisable.

The moss in which the plants are bound must, of course, be kept moist. In a shade-house this is easily effected, for it retains moisture a long time. After a hot day, water the plants and moss through the rose of a watering-pot. Though the plants soon make new roots, it is not advisable to change their position until they have taken complete possession of the moss. It may be advisable to leave them in the boxes the best part of a year, and, if not wanted for use, they will take no harm in two years.

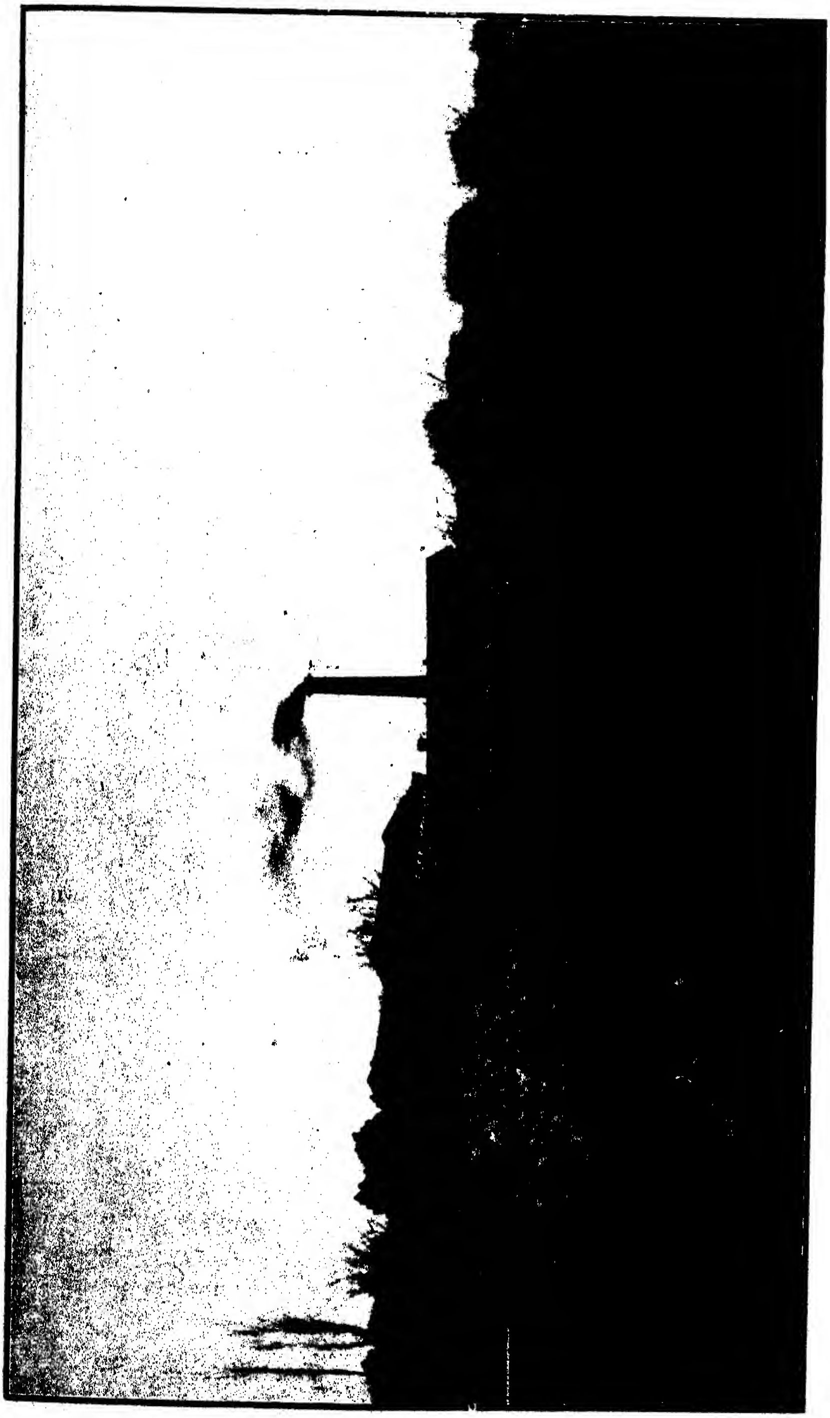
FUTURE TREATMENT OF PLANTS.

This is a somewhat extensive subject. It may be best, therefore, to touch one branch only at present, reserving subject-matter for a future article. Plants which it is desired to establish in the garden or grounds should be planted out at a time when new growth should, as a natural sequence, quickly follow. It should be understood always that the young plants should be well rooted at the time. In fact, it is more important that the plant be right than that the time be the best. In places where frost is severe. planting should be left till the end of spring. Plants quite hardy in the bush are frequently quite otherwise in the open. The moss should be left as it is round the roots, for it is full of them; but one precaution is necessary—viz., press the soil very firmly around the ball, otherwise the natural springyness of the moss may cause the soil to recede, leaving a space. The plant would then die. There is no need to harden the plants by exposure to the open air before planting, for the outer air will rule warmer than the shade-house at the time mentioned. Plants may be gathered from the bush at any time in the year if they be taken as described at the beginning of this article, but if larger plants be removed a proper season must be chosen. For instance, tree-ferns, which are the subject of many questions, can be transplanted most successfully in autumn, the month of May being the best time.

MANGEL EXPERIMENTS.

THE photograph on the opposite page illustrates the mangels grown on 4¼ acres of land at the Belfast Freezing-works Experimental Forage and Root Farm, Canterbury. It contains about 350 tons of mangels, is 100 yards long, and is 9 ft. high. It includes roots of thirty-four varieties. The best-yielding varieties were New Jersey Queen, Yellow Globe, Sutton's Prizewinner, Sugar Mangel, and Mammoth Long Red. Three hundredweight of the Belfast Company's fertilizer was broadcasted to the acre, the land being well cultivated and maintained in a clean condition throughout.

Agricultural co-operation in Germany made remarkable progress in 1912. There were no fewer than 1,541 new agricultural co-operative societies founded and registered, bringing the total number of rural co-operative societies to 26,576, with a membership of 2,500,000. There were no fewer than 342 co-operative societies formed for the distribution of electrical energy.—*Bulletin of the International Institute of Agriculture.*



THE PRODUCE OF THE EXPERIMENTAL MANGEL PLOTS AT THE BELFAST FREEZING-WORKS, CANTERBURY.

THE HEMP INDUSTRY.

W. H. FERRIS.

PRESENT QUALITY.

A SLIGHT improvement has been noticeable in the hemp forwarded for shipment during the past month from Manawatu mills. Hawke's Bay, Wairarapa, Marlborough, West Coast, and Canterbury fibre was still of good quality, the millers in these districts having apparently consistently worked to a good-fair standard, and in some cases to a fine grade, being assisted in this by having a supply of good leaf. In many instances in these districts the leaf has been sorted into different lengths and the resulting fibre baled separately. This sound procedure not only means better and more uniform stripping and more effective scutching, but the greater uniformity in the baled fibre necessarily makes it of higher commercial value, in addition to which there is less waste in the milling process, a saving which more than compensates for the slightly increased cost of production.

Hemp from the Auckland and Southland Provinces continues to be of a poor quality. This has been due largely to inferior stripping, washing, and bleaching, and in some cases to unsatisfactory scutching. It is to be regretted that a high percentage of the hemp produced in the Auckland Province this season has been of a low standard. Up to the end of May only 66 bales of good-fair were milled out of a total output of about 4,000 bales. Facing the hanks has been very noticeable this season at Auckland, but keen work on the part of the Auckland grader has had the effect of checking this deception.

RECORD WINTER MILLING.

While Southland millers have been considerably handicapped this season by unfavourable weather, millers in other parts of the Dominion, more especially those in the North Island, have experienced excellent weather-conditions. True, periodical storms have temporarily retarded operations, but unusual spells of fine weather during the present winter have enabled production to expand to an unusual degree; in fact, the winter output of fibre this season

is of a record nature. This is very gratifying in view of the good values ruling for phormium-fibre on oversea markets.

DISEASED LEAF.

The grub continues to work havoc in some phormium areas, making it practically impossible for millers working the affected flax to secure a good-fair grade, while the broken character of the fibre leads to an unsatisfactory increase in the quantity of tow produced; the character of this residual product is under the circumstances also weaker.

TOW AND STRIPPER-SLIPS.

The tow and stripper-slips coming to hand are in a very unsatisfactory condition, and in many cases have to be condemned for shipment. In only a few instances are these by-products prepared as they should be.

ADVANCING METHODS.

In several instances millers are taking steps to improve their methods of production by building more modern mills and by installing improved appliances. Two thoroughly up-to-date mills have been erected in the Manawatu district this season, and two are being constructed in the Wairarapa district.

THE CABBAGE-TREE: A POSSIBLE SOURCE OF MARKETABLE FIBRE.

A SAMPLE of cabbage-tree (probably *Cordyline australis*) fibre was recently submitted by the Imperial authorities in London to brokers to ascertain its value. The sample was fairly well prepared, but rather pulpy, of poor lustre, harsh, and somewhat brittle. The colour was uneven, being mostly deep cream, whilst some portions of the sample were greenish. The fibre, which had been insufficiently cleaned, was of irregular strength, most of it strong, but some parts weak, especially at the ends. The length varied from 1 ft. 5 in. to 2 ft. 10 in., being mostly from 2 ft. 3 in. to 2 ft. 6 in. The brokers stated that if the fibre were 3 ft. to 4 ft. in length it would be worth £25 per ton in London (November, 1912), with Mexican sisal at £34 per ton. The fibre could therefore be used for ropemaking purposes, but in order to realize good prices it should be at least 3 ft. 6 in. to 4 ft. in length.

THE APIARY.

F. A. JACOBSEN.

HIVES.

THERE are two descriptions of hives that are popular in New Zealand — viz., the ten-framed and the twelve-framed Langstroth. Their relative values depend upon the district in which they are used. The ten-framed hive is used extensively in the South Island and in parts of the North, but the twelve-framed is rapidly coming into more general use. Its particular advantage is that it gives the queen two extra combs in which to lay eggs, and when a queen-excluder is used this large brood-chamber does not cramp her operations to the same extent as a ten-framed one does. Again, the three supers necessary for manipulating hives would contain thirty-six frames, which is six frames more than three ten-framed supers would contain. This allows extra storage room, and means less handling of supers for the same amount of honey. The twelve-framed hive is very popular in the Wairarapa and Taranaki districts, where there is a goodly number of successful beekeepers. From observations made it appears to me that the larger hive is the more advantageous and economical to use in localities where there is a wealth of clover and nectar-yielding flora. A large super requires a little less attention than a small one, and when a considerable number of hives has to be attended to the saving is great.

LABOUR-SAVING DEVICES.

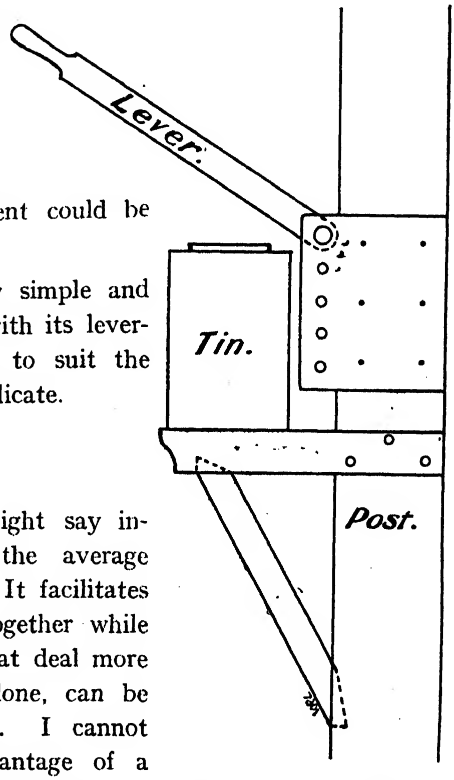
A Wiring-board.

There are many little labour-saving devices which can be used in the apiary. For instance, a quick method of wiring frames will in the long-run save an immense amount of both labour and time. A good plan is as follows: Get a well-seasoned board, 12 in. by 1 in. by 6 ft., and at one end fix your reel of wire so that it will revolve towards the other end. Place a zigzag line of staples, through which the wire is threaded, and at the other end nail a piece of ½ in. timber flat into the wiring-board, this to be of the same dimensions as the inside of a standard frame. The empty frame is now placed over this board and the wire inserted through the two bottom holes and brought back through the two top ones. The

frame is thus held rigid, and a tack may be driven into the end of the frame, around which the loose end of the wire is coiled. The wire is now drawn taut, and the running end coiled round the tack and cut, and the tack driven home. This system is one of several that expedite the wiring of frames and at the same time save a waste of wire which occurs with some of the older systems.

A Squeezer for Tin-lids.

A quick and reliable method of squeezing the lids on to small tins may be of advantage to some beekeepers who tin their honey. Select a rigid post or something similar in the honey-house, to which the arrangement could be attached.



The illustration shows how simple and yet effective this machine is, with its lever-handle, which can be shifted to suit the size of the tin, as the holes indicate.

Cramping Hives.

A most useful and one might say indispensable arrangement to the average beekeeper is the hive-cramp. It facilitates the work of nailing supers together while in a rigid position, and a great deal more work, which will be better done, can be accomplished in a given time. I cannot speak too highly of the advantage of a hive-cramp, and every beekeeper who is engaged to any extent in the business should have one.

NOTES.

Do not examine your colonies in cold weather or break up the cluster during winter.

Contract all entrances during the winter months, in order to conserve the heat in the interior.

Now or a little later is the time to shift your hives to any new position. The bees would take a fresh location when they commenced to fly in the spring.

ORCHARD-WORK FOR AUGUST.

W. A. BOUCHER.

PLANTING.

WHERE autumn planting has been deferred owing to heavy rains having rendered the soil unsuitable for planting, the month of August will provide favourable opportunities. Every advantage should be taken of the fine weather that usually prevails at intervals during next month. Peaches and Japanese plums especially should receive early attention, to be followed by the planting of other fruits that are later in coming into bud and blossom.

PRUNING.

The winter pruning of the orchard should never be overlooked. If this very necessary work has not been carried out, attention should be paid to it without delay. It is altogether unwise to allow a season to pass without pruning fruit-trees, as it is a difficult matter, and one involving more or less loss of crop, to bring the trees into suitable shape again.

TREATMENT OF NURSERY STOCK BEFORE PLANTING.

In the lifting of nursery stock the roots are necessarily more or less cut and bruised. All such cut and bruised portions should be carefully removed by cutting further back, preferably with a sharp knife, so that the bark surrounding the cut may remain uninjured. In most if not all cases it is wise to cut back all roots before planting.

TOP-PRUNING.

It is necessary that all fruit-trees should be pruned either before or soon after setting out in the orchard or garden. Trees as received usually have a considerable amount of wood which if left unpruned would do considerably more harm than good, for until a completely new root-system has commenced to form the fewer buds there are—within reason—the better the trees will flourish. Moreover, uniformity in growth is most desirable, and that can be secured only by heading back as nearly as possible to a uniform height.

Cultivation.

The working of orchard land, which for the most part will have been left untouched during the months of June and July, will now require the attention of the orchardist. When sun and wind have removed superfluous moisture from the land, leaving the soil in a moist and friable condition, advantage should be taken of every opportunity to plough, and, if necessary, cross-plough, disc, and harrow, in order to bring the soil into fine tilth, so that the working with the cultivator which will necessarily follow may proceed unhampered.

Spraying.

In connection with the spraying of peaches and nectarines, whatever may have been done or left undone, it is absolutely necessary that the trees should be sprayed thoroughly with the Bordeaux mixture, 10-10-40 formula, when the buds are swelling. Trees not so treated will almost certainly suffer later in the season from severe attacks by fungus diseases from which they will not readily recover. When spraying, care should be taken to see that all the young growth should receive a thorough coating of the mixture.

In most localities it will not be too late to spray apples, pears, and plums attacked by mussel scale and red spider with the red-oil emulsion, diluted to winter strength. A good brand of red oil emulsified with soft-soap has so far proved very satisfactory in checking infection by woolly aphis and controlling mussel scale and red spider. It must, however, be remembered that under no circumstances should the red oil be applied except at the time when the trees are dormant and the buds closed.

Cherries should be sprayed thoroughly with the Bordeaux mixture, 10-10-40 formula, when the buds show signs of swelling, in order to protect the trees from attack by leaf-scorch.

Lemons: As soon as possible after the main crop has been gathered the trees should be sprayed with the Bordeaux mixture, 4-5-50 formula. In most districts lemons are subject to attack by verrucosis and grey scab. The above-mentioned compound should be used as a preventive, otherwise the crop may be seriously affected. For scale insects, especially the black scale by which lemons are almost invariably attacked, spray with the kerosene emulsion.

Strawberries: Spray with the Bordeaux mixture, 4-5-50 formula, in order to protect the foliage as far as possible from attack by leaf-spot.

ROOT-FUNGUS.

This fungus, which is present in the light soils in many localities, will, if neglected, cause serious loss to the grower by causing the death of affected trees. Apple, plums, and gooseberries are especially susceptible to attack. As a preventive apply pulverized sulphate of iron in the proportion of 1 lb. to 3 lb. per tree, and ¼ lb. to ½ lb. per bush, according to age. Sprinkle over the surface of the soil near the trunk or stem and work lightly into the soil.

GRAPE-CULTURE.

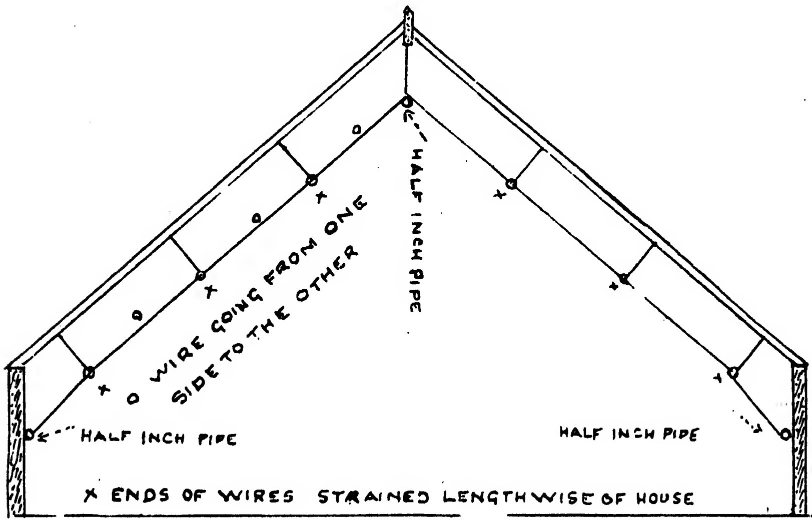
S. F. ANDERSON.

VINEHOUSE WORK FOR AUGUST.

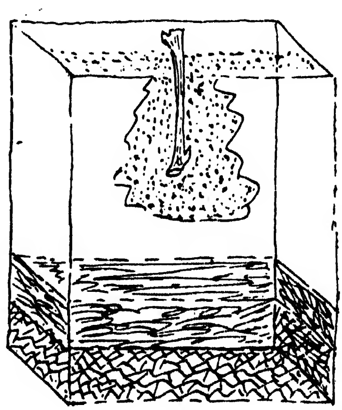
FOLLOWING the work in the cool vinehouse advised in the last two month's issues of this *Journal*, there is not much to add for August so far as the treatment of vines is concerned. If there be any alteration necessary in house-fittings, or the fixing of wires, or if a fresh coat of paint be needed, now is the time to do it. The present issue affords a fit opportunity for advising on the best methods of fixing and arranging the wires for carrying the vine-rods and their fruit-bearing laterals. As there is no uniformity in the construction of vinehouses, it is necessary to suggest a system that will apply to any span-roofed house. To economize space and obtain the best result in weight of fruit, the wires should be placed so as to obtain this. The following method of fixing the wires is advised.

Obtain sufficient half-inch piping to go, when screwed together, three lengths of the house. One length is fastened 18 in. below the top plate on each side of the house inside by strong staples, or otherwise firmly fixed. The third is suspended by screw-eyes about 18 in. from the ridge-board of the house, having a screw-eye for about every 5 ft. The wires are then fastened to the pipe on one side and passed over the pipe at the top down to the pipe on the opposite side, on which, when tightened, they are fastened. These are arranged at such distances as to suit the vine-rods and the tying-up of the fruit-bearing laterals that grow at right angles to the rods. To prevent the sagging of these wires by the weight of the vines, other wires are placed at 4 ft. apart lengthwise of the

house and strained from one end. These, of course, are stretched underneath those that pass over the piping. These wires are fastened by screw-eyes to rafters, if stout enough, or to purlins. The sketch herewith explains the arrangement advised. The best wire for this purpose is No. 12.



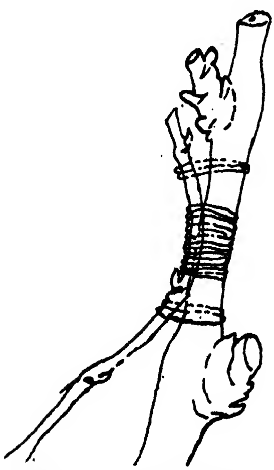
It happens rather frequently that owners of vinehouses have occasion to change the variety of grape-vines growing in their houses. The best way of doing this is by grafting the variety they wish to grow on to the old vine. If the old vine be taken out and a young vine planted in its place a loss of from three to four years must follow. By grafting this can be avoided. The best way to do this is by what is called "inarching." The method of grafting by inarching one vine upon another is very simple, and can be done by any careful person. When the grower has decided upon this work he should obtain cuttings of the variety of vine that is to be grafted on the old vine and cut them to two buds, with a bud at the bottom and one at the top. Procure 10 in. flower-pots, or kerosene-tins. If kerosene-tins be used, cut them down to two-thirds of their depth, when standing on end, and punch some holes in the bottom to provide drainage. Place a layer of broken flower-pot or



CUTTING PLANTED IN KEROSENE-TIN.

brick about 1½ in. deep, a layer of half-rotted grass or straw another 1 in., and fill within 1 in. of the top with any good soil. Put in the cutting; bury it to the top bud, and make firm. Place in a position where it can get the sun all day. To save frequent watering, the pots or tins should be plunged or buried to nearly their tops in the ground. They must not, however, be allowed to get too dry. The growth will start from the top bud, and should be trained to grow one strong shoot. Any other shoots that push forth should be pinched off but not broken out. In one season, provided the conditions given them be good, they will make sufficient growth to permit of grafting on the old vine the following spring.

The operation is managed in this way: A place on the old vine is selected where the shoot from the pot-grown vine can be conveniently brought into contact. To do this a shelf or some such support may have to be provided for the kerosene-tin. A slice about 2 in. long is then cut out of the wood of each vine, thus giving a smooth even surface on each. They are then brought together and tied above and below the cut, to prevent their being displaced, and finally bound firmly together the length of the cut. Some growers tongue each of the surfaces. The ties above and below should not be removed until some time after the union is complete. The graft can then be covered with grafting-wax.



METHOD OF INARCHING.

When the two parts have grown firmly together, the nourishment provided by the roots of the cutting can be gradually withdrawn, first by letting the soil dry in the tin, and finally by cutting off immediately below the graft. It is then only a matter of growing the new rod. When that has been obtained the old rod can be cut away in the winter.

The third international conference on refrigeration will take place in Chicago, U.S.A., in September of this year. An exhibition will be held in conjunction with the congress, and a portion of this will be devoted to an educational food exhibit by the United States Department of Agriculture, and to commercial exhibits of perishable foods of all kinds under refrigeration. Exhibits from foreign countries are desired.—*Journal of the British Board of Agriculture.*

THE FARM GARDEN.

W. H TAYLOR.

VEGETABLE-CULTURE.

FOR the economic working of the garden several things should be kept in mind. A proper rotation of crops is one of them. To grow good crops with a reasonable amount of manure the same crop should not be grown on the same ground two years in succession. This is the general principle. There are exceptions to the rule. Onions and potatoes may be grown several seasons on the same ground, with some compensation, of course. If the land be of good quality and under grass a crop of potatoes may be grown the first year without manure. The next season 3 cwt. of superphosphate per acre should be applied. This crop is often better than the first, owing to the soil being in better condition, because of the complete disintegration of the turf. If the land were under crop for a longer period, a more elaborate plan of fertilizing would have to be adopted to secure good results. But in general practice, as indicated above, a change of site is most economical, especially from the point of view of securing good results at a minimum expense. Rotation of crops means not merely growing a different vegetable, but also a variety of different characteristics. Root crops should follow such plants as cabbages or members of that tribe. But the reason for this may easily be misunderstood, and requires explanation. A good crop of cabbages or cauliflowers takes a large amount of plant-food out of the ground. Where the soil is under crop year after year a good crop cannot be got without manure. The only manure that is sufficient in these circumstances is stable or farmyard manure. But in a fresh state such manure is unsuited to root crops, although it is a perfect manure for cabbages, cauliflowers, peas, and celery. These crops and the action of rain extract from the manure all the strong properties and leave behind a certain amount of humus. Soil containing a fair amount of humus is suitable for root crops, such as parsnips, carrots, and beet-root, which may be grown successfully on such soil without further manuring. The foregoing gives the real reason for rotation of crops, which means economy in the matter of manure, rather than that the same crop will not grow continually on the same ground. It will also be seen that rotation

without proper manuring will be of no avail. If a crop of cabbages were grown without manure, the soil might be unable to produce a second crop of them. It does not follow that parsnips would succeed as the next crop; probably they also would fail. In another way there is room for economy. It is wasteful to plant a crop several months in advance of the time that would allow of its proper development. For instance, early in November is soon enough to sow carrots, parsnips, and beet-root for the main supply, and it would be wasting labour at a busy time to sow earlier. On the other hand, it would not be economical to go without an early supply because a later date would answer for sowing the main crop. That would be deprivation. The obvious thing to do is to sow a small patch early.

Vegetables now in use include *Jerusalem artichokes*. They are best left in the ground as long as they remain dormant. The time of awakening growth varies in different localities. In Wellington Province growth begins about the middle of August. Before this happens they should be lifted. Sufficient tubers for replanting should be selected. Those of medium size are best. Large tubers produce so many stems that the crop becomes overcrowded, resulting in poor and often badly shaped tubers. If the seed tubers be very small, the shoots will most likely be feeble and produce small tubers. A chance method of growing them should never be adopted; under such practice they are not worth growing at all. Dig the tubers out as clean as possible. There is no need to miss any if properly planted. Tubers required for use may be kept in a shed where they can be kept dry. Cover them with fine mould or sand, either of which must be dry. It will be useless to store them unless they are covered, for if exposed to air they speedily wither and become soft and unserviceable.

Carrots and *parsnips* begin to throw up seed-stems about the same time as artichokes begin to sprout. They should be left in the ground until signs of running are seen. The first intimation of running to seed is the sudden assumption of an extra-green appearance of the tops. As soon as this is seen the crop should be lifted. I have found that the best way to keep them is to dig a hole in the ground in a well-drained spot—the dryer the better; then put in a layer of roots and cover with soil, and so on till full. When in heaps at this time of the season they soon decay.

Spare leaves from cabbages and such plants may well be dug into the ground, but on no account dig in the stems, which take a long time to decay and are almost sure to be in the way. They make a very congenial harbour for slugs, and also encourage woodlice and wireworms. They are best dried and burned. If, however,

there is some ground being trenched, by all means put them at the bottom of the lowest spit. In that position they are beyond the reach of vermin and make a valuable addition to the humus-content of the soil. This is a reason why it is a good plan to trench a bit of ground every winter, because it affords an opportunity of disposing of a lot of matter which must otherwise lie about for a long time, and thus turn waste material to valuable account.

Peas.—At this time in most places the first peas will be up. The general currency of a crop in respect to the varieties usually grown in this country is two weeks. The obvious thing to do is to sow every two weeks. I have received several very polite hints to the effect that this is not necessary in the earlier part of the season. In some cases it may not be, but it is in this case. In some localities, where the ground is flat and the soil is very cold in winter and early spring, early growth is consequently very slow. As the days lengthen and the sun rides higher, the ground quickly acquires warmth, and growth becomes rapid. Consequently crops sown later advance more rapidly than the early ones. To such an extent does the rate of growth vary that on this place I am as early with peas sown at the beginning of August as I have been by sowing a month earlier. When such conditions prevail it would be sheer folly to sow early, for the chances are all against a good crop if the plants lag so long. But under different conditions from these early growth is more rapid, and in many years' practice I have always found it necessary to sow bi-monthly to maintain the supply. I write for general conditions, not singular instances, and so advise as I do, though now, under present circumstances, I allow a month between the first two sowings.

Cabbages and *cauliflowers* should be planted in good soil.

Lettuces should be planted and some seed sown. Lettuces are best grown in short lines against a footpath. They are easier to get at than when in long lines, and can be more advantageously worked. Lettuces require stable manure to grow quickly and well. It is only the crisp lettuce that is good, and quick growth is necessary to secure crispness.

A little *Short-horn* carrot-seed should be put in on a well-drained spot.

Turnip seed may be sown in August; put in a comparatively small lot.

Onions may be planted and sown. Onions to be planted should be from seed sown at the end of March or early in April. Older plants should not be put out, as they would inevitably bolt to seed. The large-growing varieties of Ailsa Craig and Giant Rocca type require space in accordance with their size; 10 in. to 12 in.

apart in the rows is a moderate allowance. If ground can be spared, and if the largest bulbs be desired, plant 15 in. apart; the rows should be from 12 in. to 15 in. apart. When planting onions care should be taken to bury very little of the stems, for if put in deep they form bull-necks. If the plants be of any size no attempt should be made to make them stand upright; it cannot be done unless they are planted too deeply. Merely cover the roots and leave them reclining on the ground, and they will soon grow upright. Though it is a great advantage to get seed in early, it is very unwise to sow before your spring weather, and the advent of this may be at different times in gardens only a few miles apart. Local knowledge is necessary to determine the best time, which is when soil is fit and continued growth can reasonably be expected. It is better to hold the seed for a few weeks than sow if the seedlings be likely to loiter after they are above ground. Wood-ashes are excellent for onions. We usually store a few barrow-loads in a dry shed for the purpose. After the soil is prepared, a good sprinkle of the dry ashes is broadcasted before drawing the drills. If soot is available, it is of great benefit for use in a like manner.

Potatoes.—Wood-ashes are also of great value to early potatoes. For garden purposes the potato sets should be planted in drills after the soil has been well dug. The sets are put in place with the buds upward, each set is covered with ashes, and the soil is then drawn in. The ashes provide fertilizing properties, and protect the sets from decay and insects. A little soot may be added with advantage. Soot is also of great value for early peas. When in a position to secure a supply of soot I never put in early peas without it. The soot is strewn in the drills over the peas before drawing in the covering-soil. No underground insects ever injure peas so protected, and the effect on the growth is seen in the dark green of the vigorous haulm.

Asparagus may now have a dressing of salt, 4 oz. per square yard, or half that quantity of nitrate of soda.

Sow *tomato* seed under glass.

Plant *shallots* and *garlic* if not already out. It is important that these be planted in very free soil, as anything approaching stiffness is against them. The increase is by the swelling of the cloves, and this cannot be done satisfactorily in stiff soil. Plant in rows about 15 in. apart; the sets, which should be of medium-sized cloves, to be about 10 in. apart in the rows, and not planted, but simply pressed into the soil, so that the tops are visible. The soil should be moderately manured. After they have fairly started into growth a dressing of nitrate of soda may be given. The best way

to apply the nitrate is to crush the lumps and mix evenly with dry wood-ashes. Apply by broadcasting during rain; about 2 oz. per square yard is a maximum allowance.

Herbs.—Sow parsley-seed thinly, and thin the seedlings to about 8 in. apart as soon as they are safe from slugs. This is the only way to secure fine leaves. Thyme-plants require breaking up at least every other year, as they get very woody and stunted in growth after a time. If the clumps be healthy they may be torn in pieces and small tufts with roots planted back. Plants may readily be raised from seed, either in boxes or in the open ground. Cuttings of young shoots strike freely in a cold frame if shaded from the sun. Sage-plants may be similarly treated. The non-seeding variety of sage is the better, the leaves being larger and more succulent than the old variety. It is readily increased by breaking up the old plants, or by cuttings, in a cool and shady position. Winter savoury is similar in habit to thyme and amenable to the same treatment in all respects. This herb and marjoram are valued herbs with connoisseurs on account of their piquant flavour, which is more pronounced than that of thyme. Marjoram is to be increased in the same manner as thyme. Seeds may be found to be surer than cuttings. Summer savoury is merely an annual, and dies with the first frost. It is worth growing in a good establishment, as its flavour is stronger than that of the perennial variety. It may be cut and dried for winter use, and in this way be made available all the year round. Plant mint at once, as it will soon be growing tall, and will then be difficult to establish.

Small Fruit.

Young plants of *Cape gooseberry* should be well advanced by this time. Where there is no danger of frost it is best to put them outside. It is not well to allow them to get drawn up. If they cannot be safely placed outside, the alternative treatment is to give all the ventilation possible so as to keep them stocky.

Currants and *gooseberries* should be planted as soon as possible. Cut the plants back well before planting, so as to induce strong growth. Plant 5 ft. apart in well-manured or otherwise rich soil. Gooseberry-bushes should be sprayed with 10-10-40 Bordeaux mixture. The manures advised by an authority for gooseberries and currants are — well rotted manure, in autumn, and 2 parts of nitrate of soda, 1 part superphosphate of lime, 1 part iron sulphate; 1 lb. of the mixture to 3 square yards, or, say, 10 lb. per square rod.

Raspberries should be planted at once. The young suckers springing clear of the old stools are most suitable for planting, and

should be cut down to two or three buds. Plant in triangular clumps; three suckers in a clump, 10 in. apart, and the clumps 5 ft. apart. The soil should be well drained and heavily manured in the first instance, and top-dressed with manure annually. The following is the formula for fertilizers: For rich loams—superphosphate of lime, 1 part by weight, nitrate of soda 1 part, kainit 1 part, iron sulphate ¼ part. For light ordinary soil — superphosphate of lime 2 parts, nitrate of soda 2 parts, kainit 1 part, iron sulphate ½ part.

FLOWER-CULTURE.

Where soils are heavy they become close on the surface from the effect of rainfall. No opportunity should be lost to loosen the surface, particularly around flowering-plants. It is quite wonderful what effect this little attention has on the growth of plants—more on some than on others, of course. For instance, such bulbs as narcissi, which depend for their blooms on the growth made the previous season, would probably not be affected very much by conditions that would be quite disastrous to anemones. These have their roots very near the surface and are immediately affected by a waterlogged surface, and more so because their blossoms depend on growth to come and not on growth past. But, after all, whatever the plant may be, a close, wet surface is bad and should be remedied. A not infrequent cause of loss of valued plants is a bad condition of soil, and I might also add that the want of due appreciation of the real cause leads to further mistakes. When a plant looks sick it is generally thought that it wants manure. You must not manure a sick plant; it means death in most cases. Probably no plant ever died for want of manure; it becomes stunted and poor-looking, but is otherwise sound. If leaves turn yellow when they should not, it is more likely to be caused by too much manure than by too little. It will be the soil that is to blame. When plants of a permanent character and somewhat delicate constitution, or plants that require some particular condition of soil, are planted in heavy land which is perhaps imperfectly drained, they are likely to suffer because of the soil becoming hard about them. It may become so close that the roots will be unable to work in it. The roots perish, and the plant sickens. The remedy in such cases is to work the soil carefully from about the roots and replace it with some of a more suitable character. Plants of every description should be planted in clean soil, and no strong manure should come in contact with the roots or, except in very few instances, be anywhere near them. It is a good plan to have always at hand a heap of good loam, which, with other things, will make a good compost for putting

about the roots of choice plants when putting them out and for resuscitating sickly plants. Loam, as understood by horticulturists, is turf cut from a loamy pasture and stacked till the grass and its roots are dead. Only old pastures give good turf. It is a mass of roots that is wanted to render it "fibry," as it is termed. If the loam is heavy it will require sand mixed with it, and various other things may be added according to what is being planted, such as leaf-mould, very old manure, or ashes from rubbish-fires.

The hard-wooded plants of Australia, such as waratahs, epacris, and boronias, require a soil that is sweet and free and almost the reverse of rich. Plant in sandy loam, and top-dress with leaf-mould, if possible. Heaths will do admirably if planted in a mixture of sand and leaf-mould—that is, if the surrounding soil is properly drained. I find the best way with heaths is to surround the roots with sand and leaf-mould, and cover over with the soil of the garden. In this way the roots are given a rooting-material that can never become hard, and the heavier soil above protects the light material from sun and wind, and so prevents it from drying out. No strong manure should be put near these plants.

Azalias may be planted in fibry loam and sand, and no manure applied until they are in free growth.

Camellias and *rhododendrons* may be treated similarly.

Roses, however, may be top-dressed, if the soil be not rich, with strong manure immediately after planting, because they have no delicate hair-like roots, but are strong and coarse, and are naturally gross feeders.

Current Work.

The time is opportune for the completion of all planting in the way of shrubs. It is a great mistake to leave planting till it is late. Late planting may be quite successful, in so far as the shrubs may live, but it means nearly a year lost. Shrubs and trees planted late never make many roots before dry weather sets in, consequently they make no growth till the following autumn.

Autumn-raised seedlings of flowering-plants may now be put out as the weather and condition of soil permit. These should include columbines, gaillardias, pansies, Canterbury bells, dianthus, and plants of similar character. A start may be made with the sowing of half-hardy annuals—asters, zinnias, salpiglossis, ten-week stocks, phlox Drummondii, French and African marigolds, &c. The best time to start depends on the time when it is safe to plant, and this is ruled by prevalence or absence of spring frosts. In this district it is not safe to plant till November, and the end of

August is early enough to sow the seed. In hilly country, where the soil dries early and frosts are over early, these dates would be too late. Sow at once and get the plants ready for planting in October, so that they may get a good start before dry weather sets in.

Sow *sweet peas*. The soil should be well manured and deeply trenched. Thin the plants if they come up close to each other. In poor soil they should be not less than 6 in. apart. In strong soil they may be closer with advantage. I find it so in spite of expert opinions to the contrary.

August is the best month to plant *carnations*. If the soil has been prepared well, as previously advised, it should be clean and sweet. Now, if the soil is at all heavy, put on a layer of sand about 2 in. deep. Also, in any case, give if possible a good dressing of soot, as they can do with a lot of it. Tread the soil down hard before planting. Plant deeply, so that the lower leaves rest on the soil. Press the soil very firmly about the roots.

THE RUAKURA POTATO CROP.

A. W. Green.

The work of lifting and weighing the numerous varieties of potatoes being tested at the Ruakura Farm of Instruction occupied twelve days. The crop as a whole was good, heavy in weight, free from blight and scab, and the tubers were sound. The only fault was that the average size of the potatoes was rather small. The late varieties, in most cases, gave these small tubers, no doubt due to a great extent to drought. In some cases, however, the variety was to blame, for under the most favourable conditions it would yield a high percentage of small tubers. Northern Star and Gamekeeper are two such varieties. They are also inclined to form second growth, producing secondary small tubers. Gamekeeper is a variety that has lately been well advertised as a heavy cropper and a good commercial variety, but present and past experiments at this farm go to prove that it is not worth growing. From six rows, each 4½ chains in length, the total crop gathered was five bags of eating and seed and seven bags of pig potatoes. For comparison with a standard variety, six rows of Up-to-date, each 4½ chains in length, produced fifteen bags of eating and seed potatoes and two bags and a half of pig potatoes. Each bag weighed 184 lb.

THE POULTRY INDUSTRY.

F. C. BROWN.

A BUSY MONTH.

AUGUST marks the commencement of an important period in the poultry year: it is then that the arduous work of hatching another season's stock must be initiated—that is, where general-purpose birds are bred. If stock of such breeds as Orpingtons, Wyandottes, and Rocks are to be developed into profitable birds, hatching operations must not be delayed beyond August.

Artificial incubation is becoming increasingly necessary in order to breed laying-stock at the right time. Even with strains not remarkable for egg-yielding power it is very difficult to secure the desired number of broodies when they are required, and with heavy-laying stock it is almost impossible, for the better the layer the weaker is the brooding propensity; while when the heavy layer does exhibit a desire to set it is invariably at the wrong time. Even on the farm artificial incubation must be adopted. Many who have been accustomed to hatch by the natural method do not appreciate the advantages of artificial incubation, and are apt to exaggerate the difficulties. A little intelligence and careful attention are all that is necessary to secure good results with an up-to-date machine, and, given a good hatch, the artificially produced chickens have, under proper subsequent management, a better opportunity to develop into sound, profitable stock than the majority of chickens hatched by hand. Of course, nothing can improve upon the natural process conducted under ideal conditions. However, when it is considered that the artificially hatched chick has no vermin to contend against and can be kept under the most favourable conditions at all times, it will be seen that the artificial method has distinct advantages. A fact not to be overlooked is that the hen is nature's medium and can rear her young with no assistance from a human being, and that if man is to be independent of nature he must, by study and observation, seek to provide conditions resembling the natural method as closely as possible. He is, in fact, playing the hen's part, assisted by a few ingenious contrivances which leave him to do the thinking necessary to replace the instinct of the natural mother.

True, at one time when the incubator was little understood failure was fairly frequent, principally because the instructions issued with the machine were slavishly followed; but when users came to realize that they had to do some thinking on the matter, and, studying the underlying principle, managed incubators according to the dictates of their common-sense, uniform success was attained. Care and strict attention are as necessary in artificial incubation as is a knowledge of the machine being used, but the majority of those who follow the artificial method find it no greater tax on their time than attending to setting hens, while the results are generally more reliable. I realize that it would be very useful to many of my readers to lay down the general principles to be observed in managing an incubator, but, unfortunately, there are so many styles of incubators in use that any definite instructions given in these columns cannot be applied generally.

If the business of artificial incubation were an open book, the underlying principles being readily explained and every stage of the process capable of being accurately controlled, it might be possible to lay down a definite procedure; but no one has yet thoroughly mastered the secret of incubation. The most successful men at the work have their failures. The fact remains that artificial incubation is a substitute for a natural process, and it is never likely to improve upon nature, principally because it is not possible to provide against exceptional climatic conditions which have such a powerful influence on the hatching process. For instance, a hen may hatch out chickens successfully in the open during a period of heavy rain, notwithstanding the nest being then far from dry, but she will be just as successful at a period when no rain whatever falls. Natural circumstances provide, under these extreme conditions, for the control of the moisture necessary for safe incubation. On the other hand, a machine is restricted in its power of influencing moisture, and is thereby powerless to maintain of itself the desired conditions. When it is considered that, no matter what the weather-conditions, the hen is capable of hatching successfully it will be seen that the natural process possesses advantages which cannot be artificially acquired. The natural supposition is that eggs will not take up more moisture than is required, provided an effective method of ventilation be present whereby the excess of moisture may be carried off. With the hen there is a natural force always in operation to provide the eggs with just the amount of moisture they need. If there be an excessive supply of moisture in the surrounding atmosphere the hen is capable of restricting the supply of this to the egg; whereas, notwithstanding any dearth of humidity in the atmosphere or

moisture in the grass and surroundings, the hen appears to be quite capable of controlling just the amount of moisture needed by the eggs. With the artificial system it is left entirely to the operator to decide the amount of moisture that should be supplied, and, being devoid of the natural instinct of the hen mother, it is not to be wondered at if he fail to gauge correctly the moisture required at all stages of the incubating process, especially where the climate is variable and the degree of atmospheric moisture is difficult to determine.

Thus it will be seen that, while artificial incubation is merely a substitute for a natural process and requires to be much better understood than it is, a study of the moisture and the ventilation processes is the only means of improving our knowledge of incubation and of making it a more reliable means of hatching chickens. In view of these facts, and that local climatic conditions play an important part in incubation-work, readers would be well advised to keep a strict record of weather-conditions, the range of temperatures (both in and out of the incubator), the amount of moisture supplied, and the progress of the air-cell from day to day.

The main problem in incubation vexing poultrymen to-day is the finding of well-developed chickens dead in the shell. A definite cause is apparently unknown. On close examination of such eggs there are many things to be observed indicating a probable reason for the failure to hatch. Sometimes the chickens are in such a position that it would be impossible for them to make a natural turn in order to cut their way out, while in other cases the chicken may be so large that it cannot make the necessary movement to break the shell. Where sufficient moisture has not been present in the machine the membrane (or skin on the inside of the shell) is so tough that the chick cannot pierce it, and consequently dies. On the other hand, where too much moisture has been supplied, the beak of the chick comes in contact with fluid when turning, and consequently it becomes smothered or drowned. The management of the air-cell is thus seen to be a matter of vital importance, for upon this being brought down to the correct position and the membrane at the same time being of the desired condition the success of the incubation process mainly depends.

The Breeding-pen.

As so many failures in the work of rearing stock are put down to incubators and brooders, whereas the fault is with the breeding-stock, a few remarks on the parent birds are necessary. It is essential, of course, in selecting eggs for hatching purposes that

they contain a germ; but there are germs and germs. It is only the vigorous germ from robust stock which will give hardy chickens capable of developing into profitable birds. It is a common experience with weakly breeding-stock to find dead germs in the eggs in the incubator at any time after the germ has commenced to develop; whereas with vigorous breeding-stock dead germs seldom give trouble, providing the incubator has been properly managed.

It should never be forgotten that the male bird is more than half the breeding-pen. Not only should he be of undoubted stamina and utility quality, but he should have every opportunity of maintaining himself in the best possible form. Too often a good sire stints himself in his food in his anxiety to see that the hens get all the food they want. The practice of seeing that the food-supply in the breeding-pen is abundant is therefore seen to be imperative. Of course, the supply of fancy food should be limited at all times, as fertility and not high records is the objective in the breeding-pen.

MAKING THE COMING JUDGE.

The Christchurch Utility Poultry Club is to be congratulated on a movement it has set on foot to educate the rising generation in regard to the breed and utility characters of domestic races of poultry. The idea of the club is to hold periodical meetings of young people interested in poultry, who will be afforded an opportunity of hearing addresses by leading utility poultrymen on the breeding of poultry and the judging of quality of breeding-stock according to both breed and utility points. The lectures will be illustrated by typical specimens of the different breeds. The scheme is admirable. Properly carried out, it will develop keen judges of utility poultry (of whom there is a woeful lack at the present time) and thereby furnish poultry-show societies in the future with judges whose work will make their fixtures the educative factors they should be. Not only this, but such lectures and demonstrations would bring about a better popular conception of the characters desired in utility stock, and this while ensuring the maintenance of breed-points. Breeders themselves should find in such educative gatherings much to instruct and enlighten them, especially in these days of mistaken ideas in regard to utility points conflicting with breed characters.

Other poultry societies, even those which give their whole attention to fancy stock, could copy the Christchurch example with advantage. Were such gatherings general it would no doubt

have the effect of narrowing down the differences between fanciers and utility breeders till both parties would come to see that there is really nothing to prevent the two classes of stock being judged by the one standard of excellence.

Things to remember.

You cannot breed profitable stock and lice at the same time.

It is always a safe plan to use a new wick for each hatch.

Fill the lamp on hatching-day as on other days.

The novice in incubating should consult a man of experience.

Visit the breeding-pens every day to see that the breeders have everything they require.

Constantly fight vermin. Repeated spraying and good dust-baths are necessary.

It is not wise to mate cockerels and pullets unless they are well developed.

Forcing the breeders means fewer fertile eggs and more weakly chickens.

Constant meddling with the regulator of an incubator is a mistake.

There is a right and a wrong way to trim an incubator-lamp. Learn the right way and reduce risk of fire.

The purer the air in the incubator-room the stronger will be the embryo.

Have a set time for filling the lamp and for turning and cooling the eggs.

Select the eggs for incubators with the same care as choosing a few for a sitting hen.

Now is the time to put down settings of the heavier breeds. Breeding of the lighter breeds can be postponed for another month.

If you are hatching with hens, protect them well from vermin by dusting the fowl and the nest with an insecticide—sulphur is as good as anything for this purpose.

It is not always the vermin you can see with the naked eye you have to fight, but the vermin that must be looked for with a microscope.

PASTURES AND CROPS.

JUNE.

OFFICERS of the Fields and Experimental Farms Division of the Department report as follows on the condition of the pastures and crops during the past month :—

BAY OF ISLANDS.—The weather for June was exceptionally cold, and has had its ill effect on all stock, cattle in particular. However, there has been a good growth of grass, but, as the grass has not much substance at this season of the year, this will not benefit stock to any great extent. The rainfall for the month was 5·10 in., which fell during ten days, the heaviest fall being on the 18th, when 1·23 in. was recorded. The weather was bright and steady after the 20th, and there were severe frosts at nights.—*W. J. Dunlop.*

WHANGAREI.—The weather for the month of June was particularly fine, but rather colder than usual. There was heavy rain on the 12th, 13th, and 14th; from the 23rd to the 27th the days were perfect, with bitter frosts at night. Feed is very short. The majority of farmers have used most of their hay and are beginning to buy chaff for their stock. This winter will be a record one for the importation of forage into the north.—*A. P. Speedy.*

AUCKLAND.—The weather for June was varied, being extremely cold at times, and the frosts inland being of more than average severity. The rainfall was normal, but the growth of pastures was severely checked through lack of heat in the soil. However, towards the end of the month warmer and milder weather set in, and general prospects are much brighter than previously. Stock generally are looking well. Farmers have taken advantage of the fine weather to push on with the cultivation of their land. Owing to frosty weather the potato crops on the higher levels were severely checked.—*R. Rowan.*

TE AROHA.—Unusually keen frosts with a very light rainfall were characteristic of the weather in June, consequently there was practically no growth. Nevertheless stock are looking well. The weather was ideal for cultivation, and large areas were ploughed, particularly in swamp country and virgin land. The swamp lands in this district have never before been so dry at this period of the year, and portions which in ordinary seasons would be submerged are dry, and stock are able to graze on the good rough feed.—*J. R. Morris.*

OPOTIKI.—The weather during the month of June was very dry. In some parts of the district no rain was experienced, while in other parts only light showers fell. There were some very severe frosts, which is very unusual for this district. As a result of this and the cold winds which prevailed throughout the month feed is very scarce. Rain is badly needed.—*J. Case.*

HAMILTON.—The weather during the first week in June was wet and cold; light rains fell on the 9th, 20th, and 22nd, and the remainder of the month was dry and cold, with heavy frosts. Feed is extremely scarce throughout the district, and grazing is not obtainable at any price. Stock are looking well, but on account of the scarcity of feed they will probably fall off in condition during the next two months.—*J. Kerr.*

LICHFIELD.—With the exception of three or four days on which a few mild showers fell, the month of June was a very dry one. Heavy frosts and cold southerly winds prevailed. Turnips are rapidly being fed off. Rain is urgently wanted.—*Thomas Parker.*

CAMBRIDGE.—The weather for the month of June was exceptionally dry. There were odd showers on three or four days. Heavy frosts retarded all growth. Turnips are being fed off, and hay is being brought into use. Rain is badly needed.—*A. A. Clapcott.*

TAUPO.—The weather for the month of June was very dry and mild, with a few rain-showers and light frosts. Pastures are fairly bare and dry-looking. Swede crops on the whole look well, and are being fed off.—*H. Allen.*

KING-COUNTRY.—The weather during the month of June was dry and frosty, with very little wind and plenty of sunshine. The frosts were very severe on all green growth, especially in the flat country away from the bush. Pastures are bare of feed. Hay and turnips are being used freely for all classes of stock.—*B. Bayly.*

OHAKUNE.—June opened with wet and unpromising weather. It was feared that there would be a repetition of the adverse weather-conditions of the previous month. However, the month turned out to be one of the finest winter months experienced in the district for some time. Where provision has been made for winter feed and on areas where the bush still affords a certain amount of shelter, stock are wintering well, but pastures on the open and unsheltered areas are barely meeting the requirements of stock.—*P. Barry.*

STRATFORD.—During the month of June there was a number of severe frosts, with the result that pastures are now very bare. In the latter part of the month there were some fine, warm growing-days, but the frosts retarded any growth in the pastures. All factories are closed, and the farmer has been able to proceed with clearing and ploughing. The crops of mangels which have been weeded and thinned show good yields. Green feed is looking well, but there are some instances of rust in green oats.—*A. F. Wilson.*

HAWERA.—The wet, wintry weather of May was continued with more or less severity up to the 10th June, when a sudden change to clear, frosty weather set in and lasted, with the exception of a few cloudy days, to the end of the month. Generally, the fine spell has been beneficial to stock and land. Pastures are looking fresh, and still show a fair amount of feed for this time of the year. Stock are in good condition, and, with the liberal feeding of roots, hay, and ensilage being engaged in, dairy cows should be kept in good heart for early spring calving.—*A. J. Glasson.*

WANGANUI.—Winter was not much in evidence during June, the weather generally having more of the character of spring. Clear frosty nights, followed by bright sunny days, were recorded occasionally in the coastal districts, and more frequently inland. The rainfall was light and was confined almost entirely to the first third of the month. There has been little growth in pastures, and consequently feed still remains comparatively scarce. Oat crops are looking exceptionally well, and green crops are fair.—*C. Watson.*

MANGAWEKA.—The weather did not vary much during the month of June. There were some exceptionally hard frosts. A number of days were bright and sunny, while others were dull and cold. There was very little rain; in fact, some are complaining of a shortage of water. Sheep appear to be doing fairly well. Owing to the absence of the rains which usually occur in the late autumn, there is a scarcity of cattle-feed. The roads are in good order for midwinter, and no stoppage of farm and other work has taken place.—*J. A. Melrose.*

FEILDING.—The weather for June was dry, accompanied with cold nights, which had the effect of checking all growth in pastures. Stock are looking fair. In many instances a good stack of silage or hay and a good supply of mangels would be welcomed. The need for providing food for stock in the winter months and during periods of drought is becoming increasingly evident.—*W. Dibble.*

GISBORNE.—The rainfall during June was light; consequently the roads, which are usually in a very bad condition at this period of the year, are in good order for traffic. The pastures are not abundant, but, owing to the mildness of the weather, stock are not feeling the pinch of the shortness of feed.—*William Ross.*

WAIROA.—Owing to the mild weather experienced during the month of June, the outlook from a settler's point of view bears a more promising appearance than it would have been possible to predict a short time ago. Stock of all classes continue to look fairly well. Should the present conditions continue a while longer, they will have no difficulty in negotiating the extremes of winter.—*T. F. Mullaly.*

HASTINGS.—Throughout the month of June there was ideal winter weather; very little rain, severe frosts at night, and most congenial weather during the

day. The higher ranges are covered heavily with snow. On the lower levels pastures appear to be improving. All stock are looking well.—*J. G. Parker.*

WAIPUKURAU.—The weather for June was very dry, there being only a few light showers. Very severe frosts were the order, with bright sunny days following. The weather was very suitable for graziers and those having agricultural work to do. Stock are looking exceedingly well for this time of the year.—*H. O. M. Christie.*

PAHIATUA.—There was a fair amount of good weather in June, and, compared with other districts, this district fared well. The rainfall for the month was 2·68 in. Rain fell on eleven days, the heaviest fall (0·56 in.) being on the 9th. In June, 1912, the rainfall was 6·75 in., and rain fell on twenty-four days, the heaviest fall (1·64 in.) being on the 1st. Pastures are becoming bare, and feed is scarce. Fair provision has been made for stock during the winter.—*T. Bacon.*

NORTH WAIRARAPA.—The month of June was very favourable for all farm-work. The weather was fine and clear, with plenty of frost at night. This will help all ploughed land. Those who have hay will appreciate the value of it, as turnips are not plentiful and will have to be fed sparingly to last until spring. However, if favourable weather continues, stock should come through the winter fairly well.—*J. S. Rankin.*

MASTERTON.—There was less rain during the month of June this year than in the corresponding period of last year. There were some very severe frosts. There has been a much larger area of land put under the plough this year than formerly. Some of the oat crops are well above the ground. Turnips are holding out well and are being fed off to advantage. Notwithstanding the early set-in of winter the pastures are holding out very well. Stock in most parts are looking very well.—*T. C. Webb.*

SOUTH WAIRARAPA.—The month of June was more like spring than winter, with the exception of a few frosts. The land is in first-class order for ploughing for late autumn crops. Early crops are looking exceptionally well and have made good growth. Winter feed is plentiful. Stock are looking well.—*S. C. Ivens.*

WELLINGTON.—Cold, wet, and stormy days were experienced during the earlier part of June, and a repetition of the exceptionally inclement climatic conditions of the preceding month was feared. However, a favourable change in mid-month gave mild, pleasant, almost spring-like weather, and a recovery in pastures, although slight, is noticeable. The fine spell enabled all farm-work to be pushed on vigorously.—*G. H. Jenkinson.*

BLENHEIM.—The weather during the month of June was very dry and cold. Rain fell early in the month, being heavier upon the Nelson boundary than in this district; consequently there was a slight flood in the Wairau River. A light rain fell on the 5th, and was followed by frost. There were hard frosts practically every night, being as high as 15° in Blenheim and 18° in the higher country. Rivers are unusually low for this period of the year, and farmers have had some difficulty in ploughing owing to the dry season and hard frosts. Stock are looking well.—*F. H. Brittain.*

NELSON.—For the early part of the month of June the weather was broken, and heavy rain and snow fell on the high country. On the low country about 1½ in. fell. For the last fortnight of the month the weather was beautifully fine, with sunny days and hard frosts at night. There was very little growth during the month, and pastures are getting very poor and feed scarce. Farmers have taken advantage of the fine weather, and have got on with their ploughing and threshing.—*Gilbert Ward.*

WESTLAND.—The weather at the beginning of June was extremely wet, raining almost continually until the middle of the month. Then a change set in, and fine and frosty weather was experienced up to the end of the month. As a result of the hard frosts green feed is scarce, and settlers have been compelled to feed their stock for some time.—*H. J. Walton.*

KAIKOURA.—Pastures are bare, and have made very little growth during the month of June. However, there is a good amount of hay and some fairly good root crops about, but mangels are not sufficiently grown. Stock are in good condition for the time of the year. The weather during the month was splendid. Good

hard frosts were followed by beautifully sunny days, and there was just sufficient rain to keep the soil moist.—*W. S. Goodall.*

ROTHERHAM.—The weather at the beginning of June was of a very mild character, with a good deal of wind, which was welcomed by the runholders in the back country. It caused a big thaw, and consequently the snow soon cleared and gave flockowners a chance of getting their sheep into safe country. The last three weeks of the month were very seasonable. There was a long spell of severe frosts at nights, followed by very sunny days. Large areas of winter wheat are being sown. Pastures are holding out fairly well.—*W. M. Munro.*

RANGIORA.—The weather for the month of June was good, with frosty nights and bright days nearly all through the month. Farmers are well on with their ploughing. A few potatoes and mangels have still to be lifted. Generally, it was an ideal month for the farmer.—*A. Hughes.*

LINCOLN.—From a farmer's point of view the weather during June was very good. A little rain fell. Generally, frosty nights were succeeded by sunny days. In some localities the grip of the frost prevented ploughing before midday, but with this exception the land was workable throughout the month. Turnip crops are providing a fair amount of feed, and oats, barley, and rye for feeding off are looking well. Generally, stock are in good condition.—*J. G. Scott.*

ASHBURTON.—Lovely weather was experienced during the month of June. It rained on five days only—a total of 71 points, as compared with 2 in. and 61 points for the corresponding period last year. Ploughing had to be delayed in the mornings owing to the fact that there were twenty-six nights of frost. The grass-grub is very much in evidence, especially on light land.—*C. Branigan.*

FAIRLIE.—The weather during the month of June was very good, with hard frosts at night and sunny days. There was a light fall of snow in the north end of the Mackenzie country on the 25th. All stock are doing well. A large area of winter wheat was sown, and has done well. Dun and Algerian oats are also looking well.—*W. B. Manning.*

TIMARU.—The month of June started with fine, clear weather, which was followed later by a few cold south-west storms of short duration. For the remainder of the month there were fine days, with hard frosts at night. Ploughing and general farm-work has been well pushed on, and the sowing of winter wheat is general. The district is looking well, and there is a fair amount of feed for the winter.—*J. C. Huddleston.*

WAIMATE.—During the month of June very severe frosts, with at times excessively cold weather, were experienced. However, the weather was favourable for the sowing of winter wheat and oats, the land generally being in good order. The dryness of the early winter has considerably assisted farming operations. Turnips and mangels have done comparatively well; particularly is this the case where lands were well cultivated. Pastures have held out well. Stock in general are looking well, and there is every reason to believe that they will fare well during the remaining winter months.—*F. A. Macdonald.*

KUROW.—The weather for the month of June was all that could be desired so far as the runholder is concerned, and the death-rate in high-country flocks should be light this year, providing there be no heavy fall of snow during July and August. Green feed is very scarce in this locality, although there is an abundance of hay and straw for carrying stock through the winter. There has been a big demand for chaff from this district, due, no doubt, to the supply in Southland being short.—*G. Reid.*

OAMARU.—The weather-conditions during June were good. Fine, sunny days with sharp frosts were general, and farmers have been taking full advantage of the favourable conditions to get their ploughing done. Most of the potatoes are now lifted and are being stored and pitted in anticipation of a rise in market values. Grass paddocks are bare, and hand feeding is necessary in most cases.—*W. F. Flower.*

PALMERSTON SOUTH.—Excellent weather was experienced throughout the month of June. The total rainfall from the 28th May amounted to 53 points. Rain fell on three days in June. Sharp frosts followed by fine weather were the general rule. This has proved a great benefit to stock, and has enabled farm-work to be pushed ahead.—*C. S. Dalgliesh.*

DUNEDIN.—Beautifully fine weather was experienced during the month of June. There was a fair amount of frost, with calm, sunny days; in fact, the weather was quite a marked contrast to that experienced in May. The ground is in good order for ploughing. Turnips are plentiful, and, owing to a good supply of hay, the dairy-farmers will be able to get through this winter all right.—*J. R. Renton.*

MOSGIEL.—Very fine weather was experienced during the early part of June, from the 1st to the 9th, when rain set in, heavy snow falling in the high country. The weather kept dry on the low country during the remainder of the month, but occasional showers fell on the surrounding hills. There were severe frosts at nights. The land is much better for ploughing than it was at this time last year. There are plenty of turnips for winter feed. Pastures have gone back. Potatoes will average about 7 tons per acre throughout the district. All stock are looking well. —*H. McLeod.*

STRATH TAIERI.—Splendid weather was experienced during the month of June, there being mostly fine, sunny days accompanied by frosty nights. Turnip land has been in fine condition for feeding off, and, judging by the number of fat stock leaving the district, the stock have been doing well. Pastures on the plain are rather bare, but in most cases cattle are well provided for with hay and straw.—*W. Scott.*

MANIOTOTO.—The weather in June was good up to the 22nd of the month. On that date about an inch of snow fell on the plain. Since then the days have been fine and warm, with hard frosts at night. These frosts have checked the growth of green feed and autumn-sown crops. Stock generally are in splendid heart.—*A. T. N. Simpson.*

LAWRENCE.—The weather for June was very changeable—cold and boisterous, with hard frosts at times. Ploughing was pushed on when weather permitted. Stock have not done too well on turnips, as there has been too much rain. The turnip crops are only medium, and will all be required before the grass comes.—*P. Barron.*

CLYDE.—The weather for the month of June was very cold, with some very heavy falls of snow on the high country. A good many heavy frosts were experienced, and have proved a great drawback to farmers, as the ground was too hard for any agricultural work.—*T. N. Baxter.*

BALCLUTHA.—The month of June gave much improved weather compared with the conditions of the previous months. Rain fell on thirteen days, the maximum being on the 8th, when 20½ points were recorded. Total rainfall for the month, 94 points. Very little frost was experienced, and the ground dried up wonderfully. The turnip crop is lasting very well, though a shortage in spring is expected. The yields of potato crops are very disappointing.—*H. A. Munro.*

OWAKA.—The weather for June was variable, but much better than that experienced during May. There was almost a complete absence of frost. Ploughing has commenced, but no great extent of land has yet been turned over. In sheltered localities the grass has not stopped growing. Most of the potato crops have been dug. The quality is very good, but the quantity is rather disappointing.—*R. McGillivray.*

TAPANUI.—The weather during June was erratic—at times wet and cold, with a few fine days and frosty nights. In most localities the land was too wet to permit of much work being done. Turnips are being fed off, but the crops are below the average.—*W. J. McCulloch.*

GORE.—During the earlier part of the month of June the weather was very cold and wet, but the latter part showed considerable improvement, and farmers were able to make good headway with their work. Rain fell on eighteen days, the total for the month being 2·19 in. The total rainfall for the six months ended 30th June was 25·59 in.—*B. Grant.*

LUMSDEN.—During the month of June there was, on the whole, good winter weather. The first week was wet and cold, but the remainder of the month was dry, with clear, cold days and a fair amount of sunshine. Ploughing has been pushed on. The potato crops are only fair. A large quantity of oats have been cut into chaff, owing to the wet harvest. Turnips are still plentiful.—*W. S. S. Cantrell.*

INVERCARGILL.—June was a fair winter month. During the first two weeks there was a considerable amount of rain, and, owing to the previous month being wet, farm-work was for a long time at a standstill. The rainfall for the latter part of the month was not so high, and farmers have been pushing on with the ploughing. In low places the land is still very wet. Turnips are a medium crop. Potatoes are a fair crop, but the weather has been very much against lifting them. —*J. R. Whyborn.*

OTAUTAU.—The weather for June was a great improvement on that of the previous month. A change for the better was experienced after the shortest day. There were some very heavy frosts, and these were followed by sunshine. Farmers have taken advantage of the dry weather to get on with their ploughing. All harvest appears to have been got in at last, and threshing is in full swing. Potato-lifting is not yet completed. Farmers will have to make the best of their straw for feeding purposes unless an early spring comes.—*H. F. Dencker.*

QUEENSTOWN.—With the exception of a heavy rain-storm during the first week, the month of June was dry. Hard frosts and nice sunshine prevailed. Agricultural work generally is practically at a standstill. The high and back country is still covered with snow. However, no complaints have been heard from pastoralists.—*A. Clarke.*

PEMBROKE.—The early part of the month of June was cold and stormy, and a considerable amount of rain fell. Heavy frosts then set in, the last week of the month being exceptionally cold and damp, accompanied by dense fogs. Stock are in good order, and feed is lasting well.—*J. A. Griffith.*

THE FRUIT CROP.

THE officers of the Orchards, Gardens, and Apiaries Division report as follows on the condition of the fruit crop at the end of June :—

WHANGAREI.—Apples just finished. Lemons, fair crop. Oranges—Sweet oranges very poor; "poor-man," fair crop. Loquats medium to good. Pruning is well in hand.—*J. W. Collard.*

AUCKLAND NORTH.—Apples, crop all picked. Lemons, trees looking well. Pears, crop all picked.—*W. C. Thompson.*

AUCKLAND SOUTH.—Apples, very few left; prices good. Strawberries, runners looking well. Tomatoes all done. A good deal of winter spraying now being done. —*N. R. Pierce.*

HAMILTON.—Apples getting scarce in markets; pruning of trees started. Lemons looking well; fruit more plentiful in shops. Nectarines, pruning in most places well advanced. Peaches, pruning in most places well in hand. Pears, supplies getting very low. Strawberries, planting on small scale proceeding.—*T. E. Rodda.*

POVERTY BAY.—Apples now almost over. Lemons, the effects of last August's frost will still be felt in the next crop, but there are slightly brighter prospects. Pears practically done. Walnuts, a fairly good season.—*W. R. L. Williams.*

MANAWATU AND WAIRARAPA.—Apples all gathered, majority of growers obtained good price for their apples this year; large quantity being held over for an advance in prices. Nectarines and peaches—both peach and nectarine trees look very healthy; pruning commenced in nearly all parts of district; Bordeaux mixture being used very freely for prevention of fungus diseases. Pears all gathered; good prices, especially for long-keeping varieties; pruning and spraying started.—*G. Stratford.*

WANGANUI. — Apples, prospects excellent. Apricots, condition normal. Cherries, condition good. Gooseberries, young growth strong and ripe, promising

good crop. Lemons, crops good in coastal districts. Nectarines, growth ripe and well set with flower-buds. Pears, condition excellent. Plums—English, trees fair to poor; Japanese, fair to poor: both varieties require more generous treatment. Raspberries, not much grown in this district. Strawberries wintering well. Walnuts normal. Pruning and spraying now general.—*W. C. Hyde.*

HASTINGS.—Apples, supplies short; prices good. Pears, supplies practically exhausted. Pruning and spraying generally under way.—*J. A. Campbell.*

WELLINGTON.—Apples, crop almost finished. Pears, crop almost finished. Tomatoes, crop finished. Pruning and spraying are now being carried out. Great interest is shown in the demonstrations given.—*T. C. Webb.*

NELSON.—Apples, now all gathered. Pears, now all marketed; few in cool store. Pruning in full swing.—*J. H. Thorp.*

BLENHEIM.—All fruit gathered, and growers now very busy pruning, ploughing, &c.—*B. G. Goodwin.*

CHRISTCHURCH.—Apples all gathered. There is a good quantity in cool store and sheds; generally speaking, they are keeping satisfactorily, very few going bad. During the last month several thousand cases have been shipped to the Argentine. Pears.—There is still a fair quantity being kept in the local cool stores. —*W. J. Courtier.*

TIMARU.—All fruit now gathered, and growers commencing to prune, and other cultural operations.—*A. B. Mansfield.*

DUNEDIN.—Apples still being marketed in small lots. Growers busy with pruning and planting operations.—*W. T. Goodwin.*

MARKET CONDITION OF LOCAL FRUIT AND VEGETABLES.

THE Fruit Inspectors of the Orchards, Gardens, and Apiaries Division report as follows on the condition of locally grown fruit and vegetables in the shops and auction-rooms, and the market position of these, for the month of June:—

WELLINGTON.—The supplies of apples and pears in the markets during this month have been fairly heavy, consequently the prices have fallen slightly. The quality is far from being good. Cooking-apples are in good supply, and prices are medium. Grapes arriving from Nelson opened up badly, and growers will need to exercise more care in packing the fruit on account of the rough handling they receive on the wharf. The prices for the month are as follows: Apples (dessert)—Jonathans 8s. 6d. to 10s., Sturmers 4s. 6d. to 7s. 6d., Rome Beauty 6s. to 7s., per bushel case; cooking-apples—Washingtons 5s. 6d. to 7s. 6d., Munroe's Favourite 5s. 6d. to 7s., Lord Wolseley 5s. to 7s., per case. Pears (dessert)—Winter Nelis 9s. to 10s., Winter Cole 9s. to 10s.; cooking-pears—average, 6s. per case. Tomatoes, 3s. to 4s. 6d. per half-case. Cape gooseberries, 4d. to 5d. per pound. All vegetables are much about the same as last month in prices, excepting onions, which have risen from £9 10s. to £10 10s. per ton.—*T. C. Webb, jun.*

CHRISTCHURCH.—Apples—dessert, 7s. 6d. to 8s. Cooking-pears, 8s. 6d. to 9s. Oranges, 9s. Lemons, 12s. Pines, 11s. Passions, 11s. Bananas, 12s. Potatoes, £3 15s., in paddock. Onions, £7. Carrots, £1 7s. 6d. Turnips, £1 2s. 6d.—*Gordon Esam.*

BLUFF.—New-Zealand-grown fruit on this market during June were as under: Nelson—apples; Canterbury—apples and pears; Teviot—apples and pears; Southland—apples. The Nelson apples were very choice, and dealers complained that no further supplies are available in any quantity. Canterbury apples were very good, but pears on the whole were only of medium quality. Teviot apples and pears: All parcels examined were of choice quality. Lines from this district

are increasing year by year. New Zealand apples realized—dessert, 8s. to 10s.; cooking, 4s. 6d. to 7s. 6d. Pears—dessert, 7s. 6d. to 10s. 6d.; cooking, 4s. to 7s. 6d. Imported oranges, 8s. to 12s. 6d. Bananas, 13s. to 15s. Lemons, 12s. to 15s. Mandarins, 13s. to 16s. 6d. Pines, 10s. to 12s. Passions, 9s. to 9s. 6d. Hobart apples, 12s. 6d. to 13s. 6d. Melons, 7s. cwt. Vegetables: Potatoes, £3 5s. to £3 15s.; potatoes o.t.c.s., £3. Onions, 10s. to 11s. per cwt. Carrots, 4s. to 5s. a sack. Parsnips, 4s. 6d. to 6s. 6d. Swedes, 1s. 6d. to 1s. 9d. Cabbage, 3s. to 3s. 6d. Marrows, 6s. to 8s. cwt.—*Robert Hutton.*

HONEY-CROP PROSPECTS.

THE Director of Orchards, Gardens, and Apiaries Division has received the following reports on the honey-crop prospects from the Apiary Instructors:—

AUCKLAND.—There is little change since last report, prices obtained being about the same for both honey and beeswax. Many beekeepers are now more hopeful of the future prospects of the industry in New Zealand, owing to the lessening of foul-brood and the prospects of an export trade being opened up, and they are contemplating increasing their apiaries during the coming spring.—*G. V. Westbrooke.*

WELLINGTON.—The recent shipments of honey to England have been instrumental in keeping local prices on a firm basis. The prices given in last month's *Journal* still hold good.—*F. A. Jacobsen.*

CHRISTCHURCH.—Several beekeepers have sold the whole of their crop. Prices in Christchurch are much about the same—viz., 3d. to 4d. In the Marlborough District, bulk 4d., small lots 5d. to 6d. Fresh lots are coming to hand to be graded for export. It is anticipated before long to have word from England concerning the first consignment despatched in May.—*L. Bowman.*

DUNEDIN.—The conditions prevailing last month are unaltered. Pat honey is coming forward steadily and is in good demand. Sections are scarce. Prices are firm.—*E. A. Earp.*

STOCK IN QUARANTINE.

THE following stock were received into quarantine during the month of June:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			SOMES ISLAND (WELLINGTON).		
1	Fox-terrier dog	Male ..	London	W. A. Smith ..	Napier.
1	,,	,, ..	,,	J. A. Sinclair ..	Wanganui.
1	Collie dog ..	,, ..	,,	Mrs. Porter ..	Wellington.
			QUAIL ISLAND (LYTTELTON).		
1	Pomeranian dog	Male ..	London	Dr. Houghton ..	Dunedin.
1	Bull-terrier dog	,, ..	,,	R. B. Wood ..	Ashburton.
1	Schipperke dog	Female ..	,,	,, ..	,,

THE WEATHER FOR JUNE.

D. C. BATES.

ON the whole June, meteorologically the first month of winter, was favoured with fair, though during the first half somewhat changeable, weather; consequently the rainfall was nearly everywhere less than normal. In the North Island this deficiency averaged 57 per cent., while in the South the difference was about 41 per cent. Southland was the only district that approximated the mean to any extent, and a few stations here exceeded it slightly. During the month New Zealand was affected by four well-defined types of pressure-distribution, each accounting for different weather-conditions. A cyclonic system passed in the South on the night of the 2nd, bringing general rain about that date. Two moderate westerly low-pressure areas ruled, the first between the 4th and 10th, and the second from the 15th to the 19th. Squally and changeable conditions were experienced with passing showers, especially in western districts. The remaining types were anticyclones, two, between the 10th and 14th and the 22nd and 25th respectively, being centred to the southward, brought cold easterly winds to the east coast districts. From the 25th to the close of the month normal anticyclonic conditions with fine and bright weather prevailed.

DISTRICT NOTES.

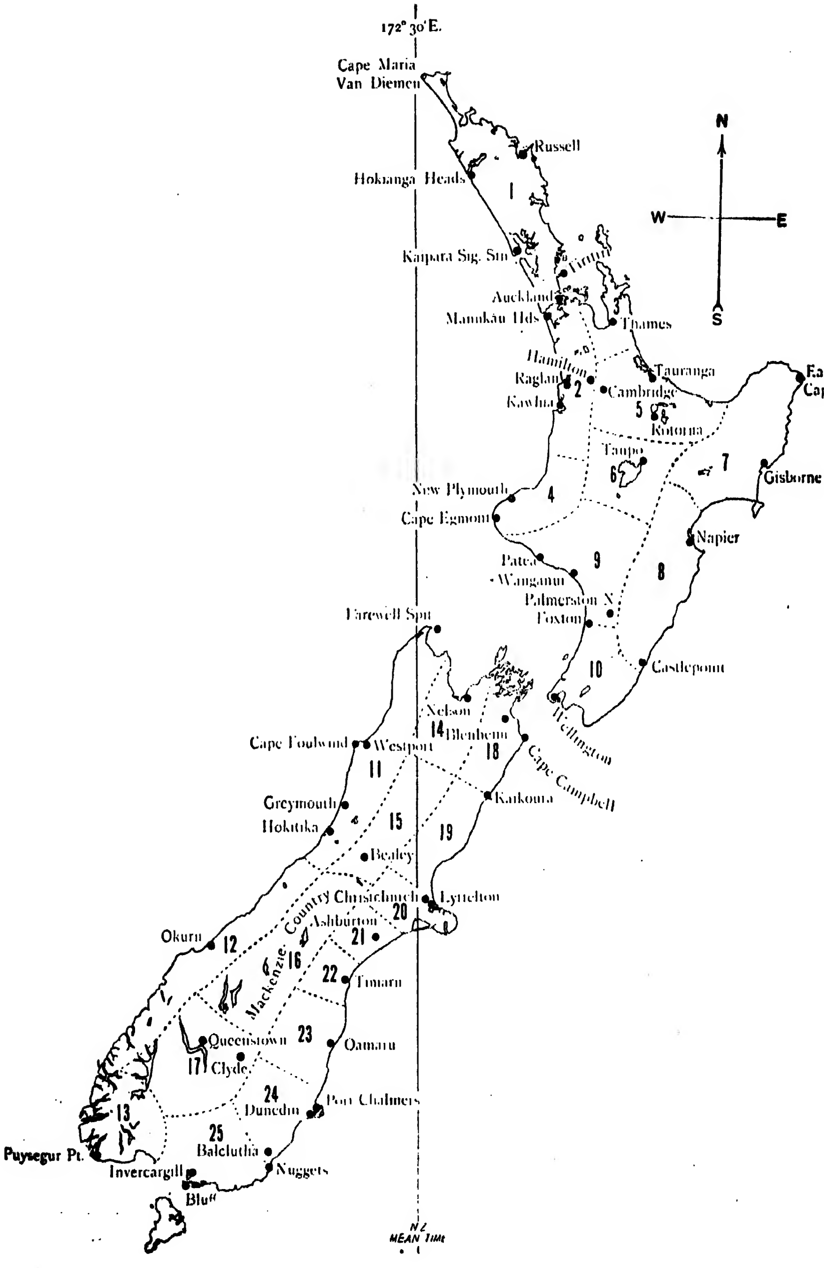
District. *Chiefly from Telegraphic Reports.*

1. Some heavy rain fell in various parts of this district on the night of the 19th, but generally precipitation was of a showery nature, mostly falling in the first half of the month. In the latter half fair weather predominated. The total rainfall was slightly below the average in the extreme north, the deficiency increasing southwards to as much as 60 per cent.

2, 3. The month was an unusually dry one, the aggregate rainfall ranging from 50 to 65 per cent. below the average. Strong winds were experienced on the 2nd, 6th, and 14th, most of the rain falling about these dates; but usually the weather was fair and, towards the end of the month, fine and clear.

4. From 40 to 60 per cent. less than the normal rainfall was recorded. During the first nine days conditions were unsettled and wet, but the remaining portion of the month was characterized by fair weather. Several hard frosts occurred in the last week.

5, 6. Much dull weather prevailed until the 16th, with showery conditions between the 1st and 9th, but afterwards fine weather continued to the close of the month,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Gisborne
New Plymouth
4
Cape Egmont
Napier
Patea
9
8
Wanganui
Palmerston N.
Foxton
Farewell Spit
10
Castlepoint
Nelson
14
Blenheim
Wellington
Cape Foulwind
Westport
18
11
Cape Campbell
Kaikoura
Greymouth
Hokitika
15
19
Bealey
Christchurch
Lyttelton
Country
Ashburton
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Okuru
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21
Mackenzie
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22
Timaru
Queenstown
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Oamaru
17
Clyde
24
Port Chalmers
Dunedin
13
25
Balclutha
Puysegur Pt.
Nuggets
Invercargill
Bluff
N.Z. MEAN TIME

District.

7, 8. Less than half the average rainfall was recorded, the month being unusually free from days of heavy rain. Cold south-easterly winds and showery conditions prevailed between the 10th and 16th, and light showers were also recorded on several other days, but with a predominance of fair weather and cold frosty nights.

9. Most of the rain fell during the first week, after which fair weather prevailed, with light and variable winds. Several foggy days were experienced, and frosts on numerous occasions. Rainfall was 50 per cent. less than the average.

10. With the exception of a few days in the early part of the month, and again on the 22nd and 23rd, the weather during June was very favourable for a winter month. From 45 to 75 per cent. less rain than the average was recorded. High winds occurred on the 3rd, 9th, 23rd, and 24th, and frosts on several occasions.

11, 12. The total rainfall was slightly below the normal for June. Boisterous weather with heavy rain was experienced on the 1st, 2nd, 8th, and in parts on the 18th, but fair weather prevailed generally in the latter half of the month, fine and bright conditions ruling from the 20th, from when until the close of the month some severe frosts were recorded.

13. About or slightly in excess of the average rain fell in this district. The weather proved cold and showery, gales being of frequent occurrence between the 1st and the 20th of the month.

14. Heavy rain fell on the 1st, and unsettled conditions ruled until the 10th, after which decidedly improved weather continued, with the exception of two days, until the close of the month. Precipitation was slightly over half the average.

15. Unsettled weather prevailed between the 1st and 8th, and again between the 16th and 19th. On the 8th some stations reported over 4 in. of rain, but days with heavy rain were few, accounting for a total fall slightly below the average. Much fair weather was experienced, with very low night temperatures.

16. The western mountainous half of this district experienced a few days of heavy rain, but the aggregate fall was slightly below the average. The eastern portion had considerably less than the usual rainfall, some stations recording as much as 70 per cent. below. Generally, the month was one of fair weather, with bright days and cold nights.

17. The departure from the normal rainfall varied in this district, some of the high stations reporting an excess, but usually the total was only slightly below. Some dull weather prevailed in the early part, but from the 10th onward fair weather was the general rule.

18. Fair weather prevailed during the greater part of the month, the only unsettled period being the first week and about the 22nd. No particularly heavy rain fell, and the total was about 65 per cent. under the average.

19–24. Rainfall was below normal in all these districts, the difference averaging about 50 per cent. No remarkable rainfalls were experienced, and with the exception of three boisterous days after the 8th the month proved very fair. Frosts were registered nearly every night, the most severe happening on the 15th and towards the close of the month.

25. Changeable and showery conditions prevailed, interspersed with a few days of fair weather. The total rainfall was about the average for June, and in some cases slightly in excess.

Agricultural Show Dates.—Manawatu and West Coast Agricultural and Pastoral Association. Palmerston North, 5th 6th, and 7th November.

During the month of June 1,296 farmers inspected the Ruakura Farm of Instruction.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble, and to ensure the best advice. In stating a question, the most complete descriptive details should be furnished.

MANURING.

H. L., Burnside, Kaitieke:—

1. What manure would you advise for oats; also silver-beet?

2. What is your opinion of broadcasting silver-beet on bush burn in place of rape?

The Director of Fields and Experimental Farms Division replies,—

1. Oats: On average soil the undermentioned manures are recommended: 3 cwt. superphosphate, 1 cwt. sulphate of potash, 1 cwt. sulphate of ammonia or dried blood per acre. Silver-beet: The Department's *Journal* for June contains an article on this subject, with particulars of manures required in order to cultivate this plant successfully.

2. I am not aware of this having been tried, and should be doubtful as to the result. Silver-beet has done well under different conditions, but the best results will be obtained only where good cultivation has been provided.

BELLADONNAS NOT FLOWERING.

MRS. M. BLACKETT, Te Kowhai, Ngaruawahia:—

I have a patch of belladonna lilies which have flowered for several years until the last two years. Can you tell me, through the *Agricultural Journal*, the reason why they have not flowered?

Mr. W. H. Taylor replies,—

Probably the bulbs have degenerated through crowding. Dig them up and replant them. Keep the bulbs well apart. Plant deeply, covering the tops of the bulbs quite 6 in. with soil.

SICK HORSES.—DOGS AFFECTED WITH WORMS.

MR. ALLAN P. FISHER, Swanson:—

1. I have two old horses whose bowels have been very loose for several weeks. They seem to be getting worse, and falling away. They have little work, and are well fed. What would you advise as a remedy?

2. What is the treatment for dog with worms (worm about 1 in. long, $\frac{1}{2}$ in. wide, $\frac{1}{16}$ in. thick, radistea head)?

The Director of Live-stock and Meat Division replies,—

1. It is difficult to say what is the cause. It might be due to intestinal parasites, or to something in connection with the food. You do not say what kind of food they are getting, or whether it is of good quality, but presume they eat fairly well, as you say they are well fed. The cause of the condition is evidently the same in both cases, as they are showing similar symptoms. I should give the animals a few bran mashes, and then one pint each of raw linseed-oil. Afterwards give them good sound food in which about 1 lb. to 2 lb. of bean-meal per horse per diem has been mixed.

2. This is evidently one of the tapeworms, but which species we could not say without examination. Starve the dog for twenty-four hours before giving medicine,

which preferably should be given in the morning. Areca-nut freshly powdered is about the best remedy. The dose of this is about 2 grains per pound weight of dog. For a sheep-dog about 1 dram of areca-nut with 3 grains of santonin should be given in two tablespoonfuls of warm milk. Keep the dog in a confined place so that you can observe whether any worms are expelled. In case they are, they should be destroyed. It may be necessary to repeat the dose in a day or so.

TOP-DRESSING PASTURE.

"GRASS," Temuka :—

I have two 12-acre paddocks of grass, which under ordinary conditions I should have ploughed up and sown in wheat, as the grass is in need of renewing. The ground is not extra heavy, but a very good, sweet soil. Would you tell me whether, in your opinion, a top-dressing of basic slag would be beneficial; and, if so, the quantity to sow per acre? And whether the grass should be harrowed; and, if so, with what sort of harrow for preference, after top-dressing? I sowed down a paddock, but as the grass did not do very well I have to still keep these two paddocks for grass for next season. Also please state when is the best time to apply manure or slag.

The Fields and Experimental Farms Division replies,—

A top-dressing of basic slag would undoubtedly be beneficial and tend to bring out the finer grasses and clovers. Sow 3 cwt. to 4 cwt. per acre. It is not necessary to harrow, and the manure should be sown as soon as possible, so that the winter rains may wash it thoroughly in. It is advisable to keep stock off the paddocks after sowing slag until a heavy rain. There is said to be the possibility of danger should stock lick it up.

PASPALUM DILATATUM.

MR. F. MAHY, The Strand, Whakatane :—

Could you tell me the best and cheapest way to treat a field of paspalum which has been in for some years—about six or more? Have you any record of successful treatment as to the best manure—whether it requires lime, &c.? I want to get the most feed from it for cows. Is it suitable for making ensilage? I noticed an account in your *Journal*, I think, of some one disc-ploughing it: what time should this be done?

The Fields and Experimental Farms Division replies,—

Would advise harrowing the field in spring with either heavy tine or disc harrows; the former if the ground be light and sandy, and the latter if heavy and hard, so as to make a seed-bed. The seed requires light covering, and, in order to give it some protection from birds, a light brush harrow should be drawn over the field after sowing, then well rolled with heavy roller: this is very essential. Top-dress with 3 cwt. to 4 cwt. basic slag per acre.

LUCERNE.

"MORICE," Puaha, Little River :—

It is my intention to try about three-quarters of an acre of lucerne. I am preparing ground with a crop of early potatoes, which will be harvested about the end of January. Would it be as well to let the ground be fallow, with occasional grubbing to kill weeds, or could I get a catch-crop of, say, millet, and sow the lucerne about September, following the potatoes; or would you advise sowing lucerne directly the potatoes are gathered?

The Fields and Experimental Farms Division replies,—

Advise letting the ground lie fallow, with occasional grubbing to keep down weeds; but as the best results would be obtained by sowing the lucerne in September or October you might take a crop of millet from the ground. Would also advise before sowing the lucerne to give the ground a dressing of lime at the rate of 15 cwt. to 1 ton per acre.

LUCERNE.

"SUBSCRIBER," Hatherley, Fendalton, Christchurch :—

1. What variety of lucerne has been found best suited for permanent crop ?
2. What quantity of seed, say, per rood ?
3. And where can such seed be obtained ?
4. I conclude the best sowing-time would be September.
5. And what manure (artificial) is best to sow with the seed ?

I have a small plot of clean land now carrying mangels, and which will be easily kept clean until lucerne is established. I think it will do well with me, as I have dug out individual plants rooting down to moisture 5 ft.

The Fields and Experimental Farms Division replies,—

1. Hunter River or Marlborough grown seed.
2. Sow 15 lb. to 20 lb. per acre.
3. Can procure from any good firm of seedsmen.
4. September or October is the best time for sowing.
5. Lime at the rate of 15 cwt. to 1 ton per acre. Should be applied some time before sowing. After sowing apply basic slag 3 cwt., and kainit or sulphate of potash 1 cwt., per acre. After sowing, the land should be firmly rolled.

ALSIKE CLOVER AND GREATER BIRDSFOOT TREFOIL.

MR. JAMES M. WADDELL, Clarkville, North Canterbury :—

1. Could you give me information about growing alsike clover for seed ?
2. What is the proper amount of seed to sow ?
3. Could any grasses be sown with it that would not interfere with the harvesting and threshing of the alsike ?
4. Would it be appropriate to sow with oats in the spring, and close up for seed the following season ?
5. Could you give similar information with respect to growing greater birdsfoot trefoil for seed ?

The Fields and Experimental Farms Division replies,—

1. Alsike clover grows best in damp places, on soils of a rich nature and containing lime.
2. 9 lb. to 13 lb. of pure germinating seed.
3. If the clover is being grown for seed it would be inadvisable to sow other grasses with it, on account of these not ripening at the same time.
4. Clover sown with oats is not usually so successful as when sown with wheat, as oats are very leafy and their shade hurts the clover. If oats be sown, a good system is to sow as heavy as 2 bushels per acre with the clover-seed, and when the oats are about 16 in. high turn in sheep to eat the crop down quickly, then take the sheep off and let the crops come again. This may be repeated two or three times in the summer, care being taken not to let the animals remain too long at a time. Strong stands of clover are secured this way.
5. Same remarks practically apply to greater birdsfoot trefoil except in the case of question 4. It would not be advisable to sow with a crop of oats.

FERTILIZERS, ETC.

G. O. R., Port Albert :—

1. What is the proper time to sow silver-beet, and the manure ?
2. What is the best kind of turnip to sow for sheep, and how much manure should be put per acre ?
3. How many pounds of inoculated soil is necessary per acre to inoculate soil ?
4. Where can it be obtained, and the cost ?

The Fields and Experimental Farms Division replies,—

1. In spring, as soon as ground is warm, and about end of March in autumn. Mangel-manure is a suitable fertilizer, and should be applied at the rate of about 3 cwt. to the acre. As it is impossible to state definitely what manure is neces-

sary for the crop in all soils and situations, the farmer must decide this matter for himself by discovering the manurial requirements of his particular soil. The following mixtures are recommended to the growers of silver-beet, for testing the question, by Mr. B. C. Aston, Chief Agricultural Chemist:—Plot 1: 1 cwt. superphosphate, 1 cwt. island guano, ½ cwt. seed gypsum, per acre. Plot 2: 1½ cwt. superphosphate, 2 cwt. island guano, per acre. Plot 3: No manure (one row). Plot 4: 1 cwt. superphosphate, ½ cwt. island guano, ½ cwt. dried blood, ½ cwt. seed gypsum, per acre. Plot 5: 1 cwt. superphosphate, ½ cwt. island guano, ½ cwt. dried blood, ½ cwt. sulphate of potash, per acre.

2. Imperial Green Globe (soft); Fosterton Hybrid; Centenary. Superphosphate 2 cwt., bonedust 1 cwt., per acre.

3. 300 lb. to 400 lb.

4. Ruakura Farm of Instruction, Hamilton East. 2s. per cwt., f.o.r.

COCKSFOOT.—ACIDS FOR DESTROYING STUMPS.

MR. H. RAYMOND SMITH, Valley Farm, Towai:—

1. To what extent is cocksfoot a milk-producing grass?

2. Can you recommend the use of acids (nitric and sulphuric) for destroying stumps?

The Director of Fields and Experimental Farms Division replies,—

1. There are large areas in New Zealand used for dairying on which cocksfoot is sown in mixtures, but it cannot be said that it would be the most suitable for milk-producing if used alone. There are numbers of grasses more so—*e.g.*, perennial rye and meadow foxtail. These, however, would probably not succeed in your district, whilst cocksfoot would.

2. Experiments with nitric and sulphuric acids are being carried on at present by the Department, but nothing definite has been arrived at. It has been reported that these acids have given good results in other parts.

SILVER-BEET.

MR. A. DALZIELL, Mangaweka:—

Could you inform me through your *Journal*,—

1. How much silver-beet seed it would take to sow an acre?

2. What manure would be the best to use?

An article on silver-beet appearing in the June number of the *Journal* deals with the points raised.—ED.

FEEDING OF CALVES AND PIGS.

MR. JAMES WALKER, Alton, Taranaki:—

1. What quantity of linseed would it be advisable to use in whey for rearing calves weaned from fresh milk?

2. What is the best method of preparing linseed?

3. Would you recommend the addition of any other foodstuff with linseed to produce a more equally balanced ration?

4. What would you advise adding to whey for pig-fattening?

The Director of the Live-stock and Meat Division replies,—

1 and 2. Soak 2 lb. whole linseed and 2 lb. oatmeal overnight in 3 gallons of water; boil for twenty minutes, adding ½ lb. flour (which has previously been mixed in a small quantity of water to prevent lumps). Give 1 pint of this gruel to every 4 pints of separated milk or whey three times daily.

3. Yes; after two months old, in addition to the above, give ½ lb. each crushed oats and oil-cake daily, with good hay.

4. About 4 lb. meal per day to every 100 lb. live weight of pig, to be mixed with pulped roots or whey. See also *Journal* of April last, in which an article on pig-rearing appears.

INOCULATED SOIL FOR LUCERNE.

MR. J. BICE, Te Rehunga, near Dannevirke :—

1. Kindly inform me where I can get some inoculated soil for lucerne.

2. Would it be possible to buy a small quantity ?

3. I sowed lucerne-seed last October—a patch a chain square. It grew splendidly for three months, then withered down and disappeared.

The Director of Fields and Experimental Farms Division replies,—

1. Inoculated soil may be obtained from the Manager of the Moumahaki Experimental Farm, Waverley, at a cost of 2s. per cwt. f.o.r.

2. Small quantities may be obtained.

3. It is impossible to give any reason for the failure of your lucerne crop, as I am not familiar with the conditions of your soil, &c.

ARTICHOKES.

MR. A. H. WHEELER, Rotomanu, Westland :—

What is the most suitable manure for artichokes ; the best time to apply ; and in what quantities, to produce tubers for pig-feed, on land consisting of sandy loam that has produced a good crop of artichokes this season, and pigs turned in to root for themselves ? Most of the stalks and all the leaves were eaten by calves. Rainfall abundant.

The Fields and Experimental Farms Division replies,—

Farmyard manure is undoubtedly the best, but if this be not available the land should be well prepared in the autumn and given a good dressing of 4 cwt. of superphosphate on the lighter classes of land or 5 cwt. of basic slag on heavier land. Where the land is sandy or gravelly an application of 2 cwt. of kainit added to the above would be beneficial. Kainit mixed with super., however, is difficult to sow through a drill unless mixed with peat or humus.

LINSEED-GROWING.

MR. S. C. HARRIS, Poranui, Banks Peninsula :—

The land is heavy loam, on a sandy clay subsoil.

1. The correct depth to sow seed ?

2. Should the seed be pickled with bluestone or anything else ?

3. Should every coulter run ?

4. Is manure—3 cwt. of super. and ½ cwt. of sulphate of potash—necessary on rich land ?

5. Is there a danger of fat-hen smothering young plants ?

6. Does frost hurt young plants ?

7. Are there any diseases to contend with ?

8. Can crop be cut with a reaper-and-binder ?

9. Does it shake easily when ripe ?

10. Is the best time to cut flax when absolutely dead ripe ?

Four crops of wheat and three crops of barley have been taken off land previously.

The Director of Fields and Experimental Farms Division replies,—

1. The depth to plant varies somewhat with the soil and season. On heavy, wet soils the seed should be planted shallower than on the lighter soils. In ordinary soils this should not be deeper than 1 in. to 1½ in.

2. It may be necessary to pickle, but as the plant is liable to disease, formalin is recommended as the cheapest effectual solution. Mix 1 pint of formalin with 40 gallons of water. This would treat 100 bushels of seed. Spread the seed on a floor and spray with the solution. Stir the seed rapidly during spraying, and continue the stirring for some time to aid the drying.

3. Seeds should be planted in rows 6 in. to 8 in. apart. By this method the plants have a better chance to branch and form seed-bolls.

4. If the land be very rich, or has been well manured before, I should not think the manures you mention necessary.

5. If fat-hen has been growing on the land, and the seed has been allowed to drop, there would be danger of its smothering other plants, as it is a fast grower.

6. Frost is very detrimental. The seed should not be planted until all danger is past.

7. There are diseases, such as wilt and rust, but if the seed be treated as above mentioned there should be no danger, especially as linseed has not previously been grown on the land.

8. The crop can be cut with a reaper-and-binder. Twine is seldom used—the crop is laid out as from a mower. If twine be used, the bundles are gathered into small loose shooks to admit of rapid drying. These are left until well dried on the upper side and then turned.

9. The seed is liable to shake when ripe.

10. It is advisable to cut before the dead-ripe stage is reached.

AGRICULTURAL PUBLICATIONS.

MR. C. D. HARVEY, Post-office Box 1017, Auckland :—

Would you inform me of the best publications on general agriculture most applicable to a beginner in this Dominion?

MASTER A. MCMILLAN, care A. McAuley, Esq., Mersey Street, Oamaru :—

I am sitting for an agricultural scholarship at the end of the year, and would be pleased, if you would send me a list of the names of any other books or pamphlets that would in any way further my knowledge of the subject; also a list of the costs.

The Director of Fields and Experimental Farms Division replies,—

Good text-books on agriculture are Fream's or Webb's "Elements of Agriture." These books are sold by most stationers. A useful book containing a considerable amount of information on agriculture is "Brett's Colonist Guide," obtainable at the *Star* Printing Office, Auckland. A very complete work on agriculture is the Standard Cyclopedia of Modern Agriculture, edited by Professor R. P. Wright. This is in twelve volumes, and is really a valuable reference. The series cost about five guineas, and would require to be ordered.

GREEN MANURES.—TARES.

MR. JAMES Y. M. COMRIE, Runciman :—

1. Have fern, tea-tree, and gorse any value as green manure, or would it be better cleared before ploughing?

2. What time should tares be sown for seed, and what time for winter feed?

The Director of Fields and Experimental Farms Division replies,—

1. Young fern and young gorse would have small value as green manure, but I would advise cutting the plants and burning them on the ground. More benefit would probably be derived in this way than by ploughing in.

2. For seed, sow tares in September; for winter feed, in April.

LUCERNE.

MESSRS. NEWSHAM BROS., Noah's Ark, Ormond :—

Being practically new-chums at dairy-farming (having spent most of our time among sheep), my brothers and I have been greatly worried over putting in green feed for cows. We took over this place last July, my brothers looking after it while I went home to England on business. Last summer, having no green feed for the cows, was very hard on us, and we are determined not to be caught again. About a fortnight ago I finished ploughing up about 4½ acres of flat, with the idea of putting in lucerne in the spring. Now, this ground has not been ploughed for ten years, and I might say that it is very sour. The soil, from 4 in. to 6 in., is

a nice black soil, but below this we get what we call "bastard clay." I have never attempted to plough such hard ground before. Instead of the shear cutting clean underneath the sod, the soil and clay stuck together, and would lift right out of the furrow, leaving holes from 8 in. to 10 in. Next time I came round the plough would be buried up to the axle of the disc, while in other places it would scarcely skim it. Now, this flat runs alongside the Mohunga drain, which empties itself into the Waipaoa River. There is very little fall from here to the river, so that when in flood it banks up the drain, and all the flats are under water until the river goes down, which as a rule is about a day and a half. Farmers about here say that I have done a very foolish thing to plough up this ground, as it is too wet for lucerne. Only one man about here has tried it. In summer we have to dig from 18 ft. to 20 ft. for water. Now, sir, if you will give me your opinion I shall be pleased to follow your advice. As it gets so dry in summer we must have feed for our cows, and we do not mean to sit down and trust to the grass. We are putting in a few acres of silver-beet for sheep also. Can we buy inoculated seed? What is the best sort of seed to sow? Does the Department sell seed? Is basic slag good for sour country?

The Director of Fields and Experimental Farms Division replies,—

From the description of the land it is doubtful if lucerne would succeed on it. The plant will not grow on swampy land, or land where water would be on the surface as long as stated, and free water must not be present in the soil continuously too near the surface. It does no harm to have the lower roots reach permanent water. Lucerne succeeds on a variety of soils, but reaches its greatest perfection on deep alluvial sandy loams of river and creek valleys or bottoms. It prefers a light soil to a heavy one, but in many localities is grown in heavy black soils and seems to do well. Lime is its favourite mineral element. If the inquirer should decide to try this plant I would advise a heavy dressing of lime—up to 1 ton per acre. The land should be ploughed and the lime applied, and then let lie fallow until spring. In addition, an application of basic slag at the rate of 3 cwt. or 4 cwt. per acre before seeding would have a most beneficial effect. Inoculated soil can be purchased from this Department. It should be applied at the rate of 3 cwt. per acre at the time of sowing. Either Hunter River or Marlborough grown seed would be the best to sow. These can be procured from any firm of seedsmen.

BURR-CLOVER SEED.

"INQUIRER," Flaxton :—

Could you inform me through the medium of the *Journal* if burr-clover seed is procurable in the Dominion?

The Director of Fields and Experimental Farms Division replies,—

Burr-clover seed would be difficult to obtain in the Dominion. The F. H. Brunning Proprietary (Limited), 64 Elizabeth Street, Melbourne, Victoria, stock this seed.

LIME.

MR. CHARLES BROWN, Hinuera :—

I wish to get a few tons of lime for the land. Can I get the desired information in the *Journal* as to where it can be had at a nominal cost?

The Director of Fields and Experimental Farms Division replies,—

Agricultural lime may be obtained from the Wilson Portland Cement Company, Te Kuiti.

FEEDING STUD SHEEP.

MR. H. S. THOMPSON, Papanui, Christchurch :—

Will you kindly inform me through your *Journal* how to feed stud sheep for show purposes, together with any other information you may have on the same subject?

The Director of Fields and Experimental Farms Division replies,—

If sheep be fed liberally throughout the year—and I presume all show sheep are—very little extra or expensive foods are required. As to the best method of getting sheep up for show, the choice lies between house and open-air feeding. Sheep are not so happy under cover as in the open air, and any judge can at once tell a shed-fed sheep by his wool. If housed, a certain amount of green feed will be required; probably lucerne would be the best. If feeding for any length of time, crushed oats with linseed cake, or chaffed lucerne and pollard, could be added. This would put on condition of the right sort, and in a very short time. Flabby fat should have no place in the show-ring. The condition should be firm, but not overfat.

LUCERNE.

H. G., Waiuta, Blackwater:—

1. Would you kindly inform me through the *Journal* where I can obtain inoculated soil for lucerne-growing; and does the Government supply it?

2. Can you get bacteria-inoculation matter for lucerne-growing from seed-merchants?

3. Is the Agriculture Department going to supply lucerne-seed this year?

4. Would wood-ashes be a substitute for potash for those plants that require potash manures?

The Director of Fields and Experimental Farms Division replies,—

1. Inoculated soil for lucerne-growing may be obtained from either the Moumahaki Experimental Farm, Waverley, or the Ruakura Farm of Instruction, Hamilton, at a cost of 2s. per cwt. f.o.r.; but I am afraid that the freight to your town would be a heavy item. You could probably obtain it from any well-established lucerne field in your district.

2. I do not think that seed-merchants keep inoculated soil.

3. It has not yet been decided whether the Department will renew its offer of last year to supply sufficient seed, soil, and lime to cultivate an acre of lucerne. Should it be decided to do so, due notice will be given in the columns of the *Journal*.

4. Wood-ashes are in some cases a substitute for potash, but of course are not quite so good.

CHOKING OF COWS.

MESSRS. OWEN BROS., Richmond Road, Inglewood:—

We have read with much interest your reply to H. W., *re* choking cow, in your *Journal* of the 15th November, 1912. You say that if the rumen is much distended it may be punctured on the left side: can you tell us the correct spot to puncture?

In the event of our finding a cow sadly "blown up" through being choked with a turnip (she may be a mile away from home), would you advise puncturing immediately, as she would probably be unable to travel to the bails to enable us to carry out the treatment you advise?

During the past autumn we had a paddock of rape, upon which we turned the cows for about half an hour the first week or so. About the tenth day they were on for about an hour and a quarter. They were then turned off as usual on to pasture. Within an hour one was noticed very badly "blown up," and she dropped dead a few minutes after. To avoid any similar occurrence, is it possible to distinguish when a cow has had too much green stuff, such as rape, clover, turnip-tops, &c.? Could you inform us what her first symptoms would be, and what course we should pursue?

The Live-stock and Meat Division replies,—

The place where the rumen should be punctured is the centre of the triangular space bounded by the last rib in front, the flat processes of the spine above, and the hip-bone behind. This space is easily located in a thin cow. When the stomach is distended with gas, however, the position does not appear the same. You try then to locate the spot as near as possible and puncture at the most prominent part, directing the trochar downwards and inwards.

Should you find an animal blown up through being choked, get the trochar as quickly as possible and puncture her on the spot. If you attempted to move her she probably would not move more than a few yards before she collapsed.

We do not know exactly what would enable you at first sight to distinguish between the distension due to choking and gaseous indigestion. The conditions under which the animal had been would help you. If she had been grazing on wet succulent food, such as green clover, &c., you would conclude the latter was the cause. In either case you would puncture. In a case of choking the accumulated gas generally escapes quickly, and the flank falls in. In gaseous indigestion the gas is generally mixed with the fermenting contents of the stomach, the latter often blocking up the canula and preventing the gas from escaping. In this case a piece of wire should be pushed down the canula to free it. Treatment of gaseous indigestion would depend a good deal on what has been eaten to cause the condition. Stimulants and chemical antidotes to fermentation should be given. Ammonia is usually found on a farm, and half an ounce of the strong liquid diluted with at least a quart of water may be given. Two ounces of turpentine mixed with the half-ounce of strong ammonia in a pint and a half of raw linseed-oil is about as good a thing as you can give.

RAPE.

G. H. G., Gordonton :—

I purpose putting in some rape for pigs next spring.

1. What is the earliest time I can sow under ordinary conditions ?
2. Would you advise me to sow anything else with the rape ?
3. What is the best manure to use ? The land I intend using is drained swamp of good quality.
4. Can you suggest anything better than rape for the purpose ?

The Fields and Experimental Farms Division replies,—

1. Sow in July.
2. Sow peas or oats with rape.
3. As the land is drained swamp, basic slag will be the best manure. Use 3 cwt. to 4 cwt. per acre.
4. Peas, oats, maize, or mangels. The last should not be fed in a very fresh state; they should be pitted or allowed to lie for a time to mature.

TOTARA POSTS.

MR. ERNEST PHILLIPS, "The Briars," Streamlands, Auckland :—

Could you kindly inform me which is the better way to put in totara posts—right way up, or upside down ? There has been a lot of argument on the matter here of late: some say one way, and some the other. It is contended that if they are put in upside down they last so much longer.

The Director of Fields and Experimental Farms Division replies,—

Totara posts are of such durability that it is immaterial whether or not they be placed in the ground in the same position as they grew.

POPLAR TIMBER.

"SUBSCRIBER," Waipukurau :—

1. Is the poplar suitable for timber for general woodwork purposes, such as butter-boxes, fruit-cases, and cabinetmaking ?
2. Is there any certain species that makes the best timber ?
3. What age would a tree require to be before it would be ready for use ?
4. Will it grow and thrive on either good or poor land; or what nature of soil suits it best ?

The Director of Orchards, Gardens, and Apiaries Division replies,—

The poplar cannot be recommended for planting for timber. A much more suitable tree is *Pinus radiata* (*P. insignis*), the timber of which has been proved to be specially suitable for fruit-cases. It is also a good shelter-tree, and will grow in almost any soil or situation. For timber purposes the trees should be planted about 4 ft. apart each way, and should be ready for use in from twenty to thirty years' time.

COMMERCIAL REPORT.

LONDON WOOL-SALES.

UNDER date of London, 8th May, the High Commissioner reports as follows on the last series of London wool-sales:—

The third series of wool-sales for this year, which commenced on the 22nd April, closed yesterday.

Starting firmly at prices on a level with those prevailing at the end of the preceding series, as the sales progressed it was noticeable that buying was not particularly animated. Purchasers showed a considerable amount of caution in their operations, and this led to some irregularity in values being noted. The supply of wool available for the series was 187,000 bales, of which 100,000 came from New Zealand. This quantity proved ample for all immediate trade requirements. High prices having now been for some time general, manufacturers have become reluctant to purchase more wool than they consider absolutely necessary for their immediate needs. They prefer to defer purchasing what wool may be necessary for forward orders until later in season, and are not inclined to lock up much money in stocks.

Although the attendance of both Home and Continental buyers has been good, American representatives have been absent. Uncertainty regarding the new American tariff apparently still keeps them off the market. The sound conditions of Home trade, referred to in my former reports to you, still continue, and the prospects for a continuance of present values remain encouraging.

While it may be said that at the close of the series of sales just ended the value of wool is virtually the same as in March, inferior merino is possibly slightly lower, while coarse crossbred is slightly dearer. The prices cabled last night to Wellington indicated the values now ruling as nearly as can be estimated.

Forty-nine thousand bales have been held over from the series, of which 24,200 are from the Dominion. It may be concluded from this that the holders have confidence in the future of the wool-market.

MEAT-TRADE TERMS.

IN connection with the marketing of Canterbury lamb the following terms have recently come into vogue: "Twos"—a carcase of lamb under 36 lb.; "fours"—a carcase of lamb over 36 lb. and under 42 lb.; and "eights"—a carcase of lamb over 42 lb. In the marketing of North Island lamb the corresponding terms are "light," "medium," and "heavy" respectively.

The steamer "Athenic," which sailed from Wellington for London on the 12th ultimo, had on board the following cargo for South American ports. For Monte Video: From Hobart—7,603 cases of apples; from Lyttelton, 852 cases of apples and 150 sacks oats; from Auckland, 14 cases of fruit-trees. For Rio de Janeiro: From Hobart, 6,450 cases of apples; from Wellington, 1,509 cases of apples; from Lyttelton, 200 sacks of potatoes, 200 sacks of oats, 50 carcases of mutton, 5 crates of hares, 1 crate of rabbits; from Dunedin, 500 sacks of potatoes.

The steamer "Kaipara," which sailed from Wellington for London on the 6th ultimo, had on board a transhipment of 13,700 cases of apples from Hobart for Monte Video.

The steamer "Paparoa," which sailed from Wellington for London on the 27th ultimo, had on board the following cargo for Monte Video: From Hobart, 13,975 cases of apples and 30 cases of jam; from Wellington, 42 packages of trees and plants, 10 cases spraying-oil, and 60 sacks of oats.

The steamer "Rimutaka," which sailed from Lyttelton for London on the 24th ultimo, took the following cargo from Lyttelton for Monte Video: 2,470 cases apples and 4 packages sundries.

FREIGHTS ON OVERSEA CARGO.

RATES FOR GREAT BRITAIN, VANCOUVER, AND SAN FRANCISCO SHIPMENTS.

FOLLOWING are the rates of freight on cargo from New Zealand to London and West of England ports by the vessels of the New Zealand Shipping Company (Limited), Shaw, Savill, and Albion Company, (Limited), Tyser, and Federal and Shire lines :—

		s.	d.
Wool, greasy, and sheep-skins	Per lb.	0	0⅝
,, slipe	,,	0	$0\frac{11}{16}$
,, washed	,,	0	0¾
,, undumped	,,	0	0¼ extra.
Meat—June to November (inclusive)	,,	0	$0\frac{9}{16}$ less 7½%.
,, December to May (inclusive)	,,	0	$0\frac{11}{16}$ less 5%.
Butter	Per box	2	6
Cheese	Per lb.	0	0½
Hemp	Per ton weight	85	0
Grass-seed	,,	40s., 50s., 60s.	
Tow, covered	,,	100	0
,, uncovered	,,	130	0
Sausage-casings	,,	55	0
Leather and basils	,,	65	0
Tallow, pelts, and oleo	,,	40	0
Preserved meats	Per ton measurement	40	0
Rough measurement	,,	42	6
Fine measurement	,,	55	0

Primage, 10 per cent.
These rates will be as above from 1st July to 31st December next.

The following rates of freight are charged by the Union Steamship Company of New Zealand (Limited), under contract with the New Zealand Government, for the carriage of cargo from Auckland and Wellington to San Francisco, and Auckland to Honolulu, Victoria, and Vancouver :—

AUCKLAND AND WELLINGTON TO SAN FRANCISCO.

		s.	d.
Butter	Per lb. gross	0	1
Meats in refrigerator	,,	0	0¾
Skins	Per ton of 2,000 lb.	50	0
General cargo	Per ton of 40 cub. ft.	50s. to 60s.	
Wool (maximum freights)—Greasy	Per lb.	0	0½
,, ,, Scoured	,,	0	0⅝
Phormium	Per ton of 2,240 lb.	60	0

AUCKLAND TO HONOLULU, VICTORIA, AND VANCOUVER.

		s.	d.
Butter	Per lb. gross	0	1
Meats, in refrigerator	,,	0	0¾
Wool, greasy, dumped	Per lb.	0	0½
,, scoured, dumped	,,	0	0⅝
Phormium, dumped	Per ton of 2,240 lb.	50	0
Skins, dumped	Per ton of 3,000 lb.	50	0
General cargo	Per ton of 40 cub. ft.	50s. to 60s	

THE DOMINION'S EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.	Sundry.
January,	1913	166,714	229,179	6,886	109,251	63,864	118,986	..	329	..	6,969	2,215	4.110	611 carcases pork.
,,	*1912*	*237,284*	*302,399*	*12,424*	*114,512*	*64,005*	*95,994*	..	..	*7,295*	*6,365*	*1,942*	*3.407*	*59* ,,
February,	1913	326,337	403,698	12,666	89,098	81,733	127,968	..	..	..	12,520	4,295	7,973	64 carcases pork.
,,	*1912*	*208,424*	*273,246*	*13,052*	*101,544*	*62,398*	*106,074*	*607*	..	..	*6,831*	*1,615*	*1,056*	..
March,	1913	86,224	210,166	7,428	47,560	59,844	49,661	..	115	..	12,552	7,662	4,043	250 carcases pork.
,,	*1912*	*324,192*	*518,402*	*20,201*	*64,925*	*49,308*	*70,022*	..	*4,980*	..	*3.832*	*1,352*	*2,644*	*16* ,,
April,	1913	303,937	647,948	16,834	11,358	52,934	61,988	..	300	..	9,049	3,351	3,889	457 carcases pork.
,,	*1912*	*213,178*	*355,829*	*7,046*	*38,986*	*38,137*	*31,615*	*4,905*	*2,180*	..	*5,134*	*1.958*	*4.458*	..
May,	1913	418,221	731,520	22,073	637	46,304	33,281	..	265	2,000	15,751	5,005	9,057	100 carcases pork.
,,	*1912*	*454,506*	*744,287*	*32,691*	*1.441*	*40,535*	*51,833*	*11,157*	*26,569*	*1,500*	*11,963*	*2,826*	*6,287*	..
June,	1913	315,034	528,815	24,444	79	3,166	18,741	..	..	13,072	13,592	4,065	5,439	588 carcases pork.
,,	*1912*	*170,738*	*287,697*	*24,605*	*558*	*7,712*	*18,138*	*9,160*	*7,622*	*2,039*	*5,646*	*1,168*	*1,213*	*221* ,,
July,	1912	291,097	371,474	29,457	684	1,255	16,567	44,324	23,216	20,573	7,463	1,856	5,892	210 carcases pork.
,,	*1911*	*206,869*	*260,761*	*14,296*	..	*276*	*14,100*	*29,452*	..	*10,334*	*6,022*	*1,073*	*2,786*	*175* ,,
August,	1912	207,239	157,589	10,478	559	..	10,409	42,580	38,802	19,562	3,758	523	4.219	..
,,	*1911*	*66,608*	*110,054*	*3,653*	..	..	*5,260*	*31,976*	..	*18,231*	*3,443*	*303*	*3,475*	*203 carcases pork.*
September,	1912	44,657	40,759	1,174	8,723	1,204	6,671	15,742	17,303	19,933	2,957	501	3,671	..
,,	*1911*	*102,081*	*40,057*	*6,059*	*6,404*	..	*7,390*	*38,151*	..	*33,059*	*5,604*	*393*	*7,672*	*220 carcases pork.*
October,	1912	51,263	15,393	3,882	49,962	16,389	4,047	7,952	64,480	5,396	4,193	401	9,075	..
,,	*1911*	*9,417*	*2,043*	*100*	*49,626*	*11,501*	*2,182*	..	..	*32,094*	*4,514*	*754*	*2,982*	..
November,	1912	54,175	8,286	282	140,751	57,181	33,305	3,680	40,896	13,892	9,866	1,911	5,466	..
,,	*1911*	*47,770*	*10,427*	*403*	*135,741*	*57,319*	*44,934*	*15,833*	..	*16,606*	*7,844*	*2,183*	*3,085*	..
December,	1912	117,740	106,310	4,774	119,885	66,213	44,789	5,868	30,490	10,070	3,816	2,613	3,686	..
,,	*1911*	*72,192*	*91,965*	*765*	*109,397*	*46,883*	*54,297*	..	..	*4,366*	*5,719*	*1,364*	*2,708*	..

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE THREE MONTHS ENDED 30TH JUNE, 1913.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. Hinds.	Beef. Fores.	Butter. New Zealand.	Butter. Danish.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila.	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila.	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
1913.							d.	d.	d.	d.	d.	d.															
April, 5	..	..	..	..	..	..	4½	4⅛	6¼	6¼	3¾	3⅛	117/0	125/0	60/6	..	64/6	34/0/0	31/0/0	33/0/0	34/10/0	31/10/0	34/0/0	..	..	..	..
" 12	..	..	..	..	..	..	4½	4¼	6⅝	6⅜	4¼	3½	115/0 117/0	120/0	60/0	59/0	65/0	33/0/0	30/0/0	33/0/0	33/0/0	30/0/0	33/0/0	..	..	..	..
" 19	..	..	..	..	..	..	4½	4¼	6⅝	6⅜	4¼	3½	113/0 115/0	119/0	58/0	..	..	33/0/0	30/0/0	33/0/0	32/0/0	29/10/0	33/10/0	..	..	23/0	21/0
" 26	..	..	..	..	..	..	4½	4¼	6¾	6⅜	4	3⅜	113/0 115/0	120/0	58/6	..	..	32/0/0	28/10/0	33/0/0	32/0/0	28/10/0	34/0/0	..	..	..	..
May 3	..	..	..	..	..	..	4⅜	4⅛	6⅞	6⅝	3¾	3¼	113/0	117/0	58/6	57/6	..	31/0/0	28/0/0	33/0/0	31/0/0	28/0/0	34/0/0	..	..	..	..
" 10	..	..	..	..	..	..	4⅜	4⅛	6¾	6½	3⅝	3⅛	113/0	114/0	58/0	56/6	..	31/0/0	28/0/0	33/10/0	31/0/0	28/0/0	34/0/0	..	..	..	..
" 17	..	..	..	..	..	..	4⅜	4⅛	6¾	6½	3⅝	3⅛	113/0	114/0	59/0	56/6	..	31/10/0	28/10/0	33/0/0	32/0/0	28/10/0	33/10/0	..	39/0	22/6	20/6
" 23	..	..	..	..	..	..	4⅜	4⅛	6½	6¼	3⅝	3⅛	113/0	114/0	59/6	57/6	..	31/10/0	28/0/0	32/0/0	32/0/0	28/0/0	32/10/0	..	..	..	..
" 30	1/4	1/4½	1/5¼	1/9	2/0	2/5¼	4½	4¼	6¼	6	3⅝	3⅛	115/0	115/0	61/0	59/0	..	30/0/0	26/10/0	32/0/0	30/0/0	26/10/0	31/0/0	..	..	..	..
June 7	..	..	..	..	..	..	4½	4¼	6½	6⅛	3⅝	3⅛	115/0	115/0	60/6	58/6	..	29/0/0	26/0/0	31/0/0	29/0/0	26/0/0	31/0/0	..	39/0	..	21/6
" 14	..	..	..	..	..	..	4½	4¼	6½	6⅛	3⅝	3¼	113/0	116/6	60/6	58/6	..	28/10/0	25/0/0	29/10/0	28/10/0	25/0/0	29/10/0	..	..	23/0	21/6
" 21	..	..	..	..	..	..	4½	4¼	6⅜	6	3⅞	3¼	113/0	121/0	61/6	59/6	60/6	28/10/0	24/15/0	30/0/0	29/0/0	25/0/0	29/10/0	..	..	..	..
" 28	..	..	..	..	..	..	4½	4¼	6¼	5⅞	4	3¼	115/0	..	63/6	61/6	62/0	30/0/0	26/10/0	30/0/0	30/10/0	27/0/0	29/10/0	..	..	..	..

HEMP AND TOW GRADING RETURNS.

JUNE.

Hemp.—The total number of bales graded was 14,584, as compared with 6,092 for the corresponding month of last year, an increase of 8,492 bales. For the twelve months ending 30th June, 1913, the number of bales graded was 145,661, as compared with 91,356 for the previous twelve months, the increase being 54,305.

Tow.—During the month 5,144 bales were dealt with, as compared with 1,594 for the corresponding month of last year, an increase of 3,550 bales. For the twelve months ending 30th June, 1913, the number of bales graded was 50,553, as compared with 25,080 for the previous twelve months, the increase being 25,473 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF JUNE, 1913.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.	Common.	Rejected.	Con-demned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	665	2,022	466	44	1	3,198
Napier ..	..	188	20	272	..	..	..	480
Foxton ..	..	..	721	3,122	240	11	..	4,094
Wellington ..	..	..	1,768	2,002	127	12	..	3,909
Blenheim ..	..	34	432	120	..	..	..	586
Picton ..	..	37	226	86	..	..	..	349
Lyttelton ..	..	70	5	8	..	..	..	83
Timaru ..	..	..	..	..	208	48	..	256
Dunedin ..	..	..	63	185	41	..	..	289
Bluff	..	..	153	1,035	140	12	..	1,340
Totals ..	..	329	4,053	8,852	1,222	127	1	1,4584
Percentages of totals	..	2·25	27·79	60·70	8·38	0·88	..	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	60	391	814	182	1,447
Napier	..	39	61	..	100
Foxton ..	103	395	478	..	976
Wellington ..	168	796	515	47	1,526
Blenheim ..	110	99	36	..	245
Picton	17	121	61	..	199
Lyttelton ..	..	78	..	..	78
Dunedin ..	..	9	29	15	53
Bluff	..	37	323	160	520
Totals ..	458	1,965	2,317	404	5,144

Stripper-slips.—Passed for export: Auckland, 28; Napier, 8; Foxton, 297; Wellington, 127; Blenheim, 11; Bluff, 2—total, 473. Condemned: Auckland, 2; Foxton, 26; Wellington, 69; Bluff, 6—total, 103.

NEW ZEALAND-SAN FRANCISCO TRADE.

THE following are the shipments of produce for San Francisco, Rarotonga, and Tahiti, and transhipments for Vancouver from New Zealand, since February last:—

—	"Moana," 28th Feb.	"Aorangi," 28th March.	"Tahiti," 25th April.	"Moana," 23rd May.	"Aorangi," 20th June.
Gum, packages	20	50	..	30	45
Seeds, sacks	..	31	61	..	800
Grain, &c., sacks	324	57	115	84	59
Meat, cases	100	262	250	355	154
Onions, cases	1,759	10	8	19	13
Potatoes, sacks	2	32	10	27	24
Sundries, packages ..	54	131	235	210	122
Butter, boxes	7,281	3,783	405	8	4
Hemp, bales	282	..	271	394	262
Frozen lamb, carcases ..	2	3	2	2	2
,, veal, ,, ..	..	..	..	..	..
,, beef, quarters ..	150	..	..	..	..
,, sundries, packages ..	2	..	13	..	..
Timber, pieces	..	93	..	..	1,151

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since January last:—

—	"Makura," 17th Jan.	"Zealandia," 14th Feb.	"Marama," 14th March.	"Makura," 12th April.	"Niagara," 10th May.	"Marama," 6th June.
Butter, boxes ..	10,960	5,205	9,402	6,535	465	1,210
Mutton, carcases	..	..	..	..	1,291	50
Beef, quarters ..	716	..	1,254	2,428	5,492	2,271
Veal, carcases ..	276	181	400	402	324	..
Frozen sundries, packages	..	39	147	86	79	90
Wool, bales ..	30	..	..	..	50	351
Grass-seeds, beans, &c., sacks	..	54	..	147	..	..
Hides and skins, sacks, &c.	329	583	..	249	270	1,675
Onions, cases ..	14	1,572	..	732	25	..
Sheep-skins, bales	24	112	..	24	..	..
Jam, cases ..	50	75	175	25	91	75
Sundries, packages	313	250	214	470	112	103
Potatoes, crates	20	..	..	..	..	..
Kauri-gum, packages	..	176	41	7	150	44
Hemp, bales ..	246	129	126	..	126	167
Rabbits, crates..	..	..	..	..	..	500

STOCK EXPORTED.

JUNE.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of June :—

Port of Shipment.	Horses.		Cattle.		Sheep.		Swine.
	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To Pacific Islands.
Auckland	9	18	..	29	..	561	5
Gisborne	2	..	..	..	..	..	..
Wellington	17	..	1	..	656	..	..
Lyttelton	35	..	..	..	1,690	..	..
Dunedin	45	..	..	..	1	..	..
Bluff	85	..	..	..	2,202	..	..
Totals	193	18	1	29	4,549	561	5

The following are particulars of horses shipped: Draughts—92 stallions, 19 colts, 49 mares, 12 geldings; thoroughbred—1 stallion, 11 mares, 6 geldings; hacks—9 mares; harness—4 mares; ponies—6 mares; donkeys—2.

The following are particulars of sheep exported: Romney Marsh—532 rams, 2,116 ewes; Lincoln—87 rams, 550 ewes; Border Leicester—115 rams, 395 ewes; English Leicester—333 rams, 169 ewes; Corriedale—143 rams, 95 ewes, 11 wethers; Shropshire—3 rams.

PRODUCE IMPORTED.

THE following return, compiled by the Customs Department, shows the total importations into New Zealand during the month of June, 1913, of agricultural and farm products :—

Item.	Quantity.	Value.
	£	
Bran	..	..
Butter	17 cwt.	77
Cheese	..	6
Chaff	..	..
Fruits, fresh, all kinds	1,019,260 lb.	6,506
Barley	11 centals	11
Oats	170 centals*	127*
Wheat	30 centals	22
Onions	6,107 cwt.	2,341
Pollard and sharps	247 tons	1,175
Potatoes	4 tons	30
Seeds, grass and clover	1,009 cwt.	2,516
Total value imported ..	..	£12,811

* Includes 112 centals, value £35, returned New Zealand produce.

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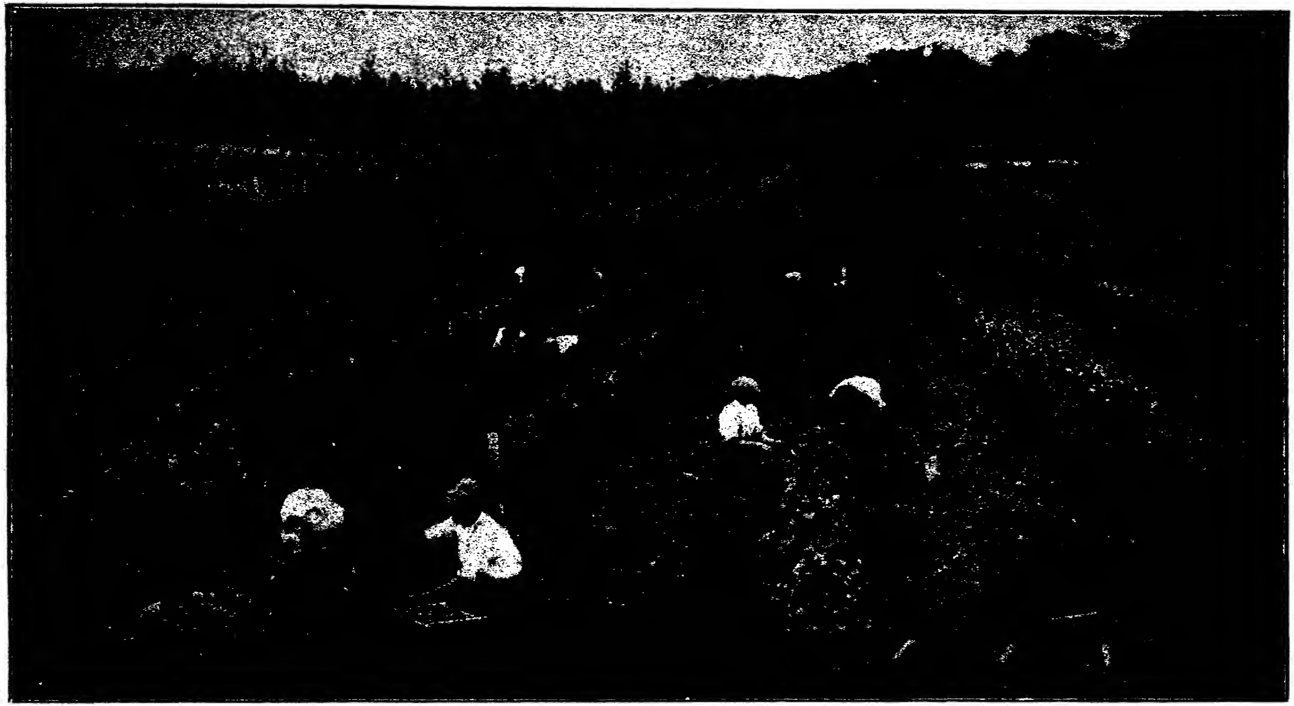

Harvesting the Grape Crop at Waerenga Experimental Farm.]

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PHOSPHATES:

THEIR IMPORTANCE TO THE NEW ZEALAND FARMER.

B. C. ASTON, F.I.C.

INTRODUCTION.

SEEKING for the best method of presenting the phosphate question to readers of the *Journal*, I find that the matter more readily lends itself to treatment under the following heads :—

(1.) Our requirements based on the fertilizer imports.
(2.) An examination of the known deposits of phosphates, their extent and availability.
(3.) A survey of the store of phosphates present in the soil, and the means of utilizing them.
(4.) A study of the amount of phosphates removed from the soil by crops and stock.
(5.) Consideration of the possibility of altering our methods of agriculture in order to economize phosphates.

I have dealt with the matter enumerated under headings (1), (2), and (3) in the last two numbers of the *Journal* at considerable length. I propose to continue the account of the store of phosphates in the soil, and the means of utilizing and reinforcing them, leaving to a subsequent communication the phases mentioned under headings (4) and (5).

Influence of Lime.

It is necessary for the attainment of a correct comprehension of the principles underlying the use of phosphatic fertilizers that the effect of lime should be considered, but it is not necessary here to say more about lime as a dressing for soils than so far as it immediately affects the subject of this article. (It is hoped at some future time to deal more fully with lime as a factor in successful farming.)

Available lime* is deficient in most New Zealand soils which have a good rainfall. When soluble phosphates, such as superphosphate, are applied to the soil they are soon dissolved by the rain and washed a few inches into the soil, where the phosphate is precipitated or made insoluble by combination with the lime, alumina, and iron compounds present. If this happens with superphosphate soluble in pure water, we may be certain that such phosphates as those of basic slag, bonedust, and guano will not sink very far into the soil, for they are practically insoluble in pure water, and require that there shall be either salts, carbonic acid, or some other acid present in the water before they can be carried slowly into the soil, where further downward progress is arrested as in the case of superphosphate. The new compounds formed, known respectively as the phosphates of lime, alumina, and iron, differ in the extent to which they will dissolve in the soil-water, the medium by which they are absorbed by the plant. Lime phosphate is taken up more readily than the other kinds. We may compare the condition of these phosphates to that of the balance at our bank—some funds available at call, and some on fixed deposit, which can be made available only at some trouble or expense. If we have an excess of lime present in the soil a larger proportion of readily available phosphate will result on manuring with phosphates. It is found to be the case that limestone soils which contain comparatively little iron or alumina and much lime can grow good crops with a smaller amount of phosphate than do soils (with little lime and much iron and alumina) under the converse conditions. Application of lime to a

* By "available lime" is meant carbonate of lime, which is recognized in the soil by effervescence when a dilute acid, such as spirits of salt, is mixed with it.

Results of manuring Swede Turnips with Phosphates at Moumahaki Experimental Farm, indicating the Great Need that Turnips have for Phosphates.

No. 29 (left hand) manured with 2 cwt. superphosphate, ½ cwt. ammonium sulphate, ½ cwt. potassium sulphate, per acre. Yield per acre, 34½ tons. No. 28 (middle): No manure. Yield per acre, 1¾ tons. No. 27 (right hand) manured with 2 cwt. prepared guano per acre, containing 31 per cent. of tricalcic phosphate, 25 per cent. of insoluble nitrogen, and 2 per cent. of potash. Yield per acre, 27¾ tons.

soil tends to diminish the formation of phosphates of iron and alumina, and if these be already formed it decomposes them with the formation of the more available phosphate of lime. It is hoped that this wonderful provision by which nature contrives that the soil should not be depleted of its phosphates by leaching with rain-water has now been made clear.

CHEAPER LIME WANTED.

There are many other reasons why a plentiful lime-supply in the soil should be maintained, apart from its beneficial influence on the phosphates, which need not now be touched upon. However, a point to which attention must be drawn is the difficulty of obtaining supplies of lime at a reasonable rate. New Zealand is so generously provided with limestone that to those who see the working of an ordered mind in the creation of things the fact that limestone is found near the very places where it is most needed will come as an additional proof to their belief. Strangely enough, in many large areas of country where the application of lime does no good, or rather harm, little or no limestone is found. Deposits at Campbell Island, Auckland Islands, Chatham Islands, Southern Waiau, Winton, Milton, Arrowtown, Southern Fiords, Greymouth, Oamaru, Mount Somers, Waikare (Canterbury), Porter's Pass, Nelson, Marlborough, Te Kuiti, Mauriceville, Makuri, Hawke's Bay, and Whangarei show that limestone is so widely distributed that, when the country is fully provided with railroads, the 100 miles free carriage of lime allowed by Government will easily permit of any farmer obtaining free railage of any lime required. Ground limestone in New Zealand at present costs from 10s. to £1 per ton on the trucks. In America (Illinois) a number of firms supply ground limestone at 60 cents a ton (presumably a "round ton" of 2,000 lb., equivalent to, say, 2s. 9d. per long ton of 2,240 lb.), and more coarsely ground material and larger quantities may be obtained even more cheaply. In New Zealand the chemist's advice to the farmer to apply lime is now sometimes met with the rejoinder that it would cost, including freight, &c., £2 10s. per ton—an entirely prohibitive cost. Inquiry is now being made as to whether some cheaper method of obtaining the lime can be found. It may be remarked that one of the suppliers of cheap lime in America is a penitentiary, a fact which suggests possibilities in New Zealand.

Having seen the great influence of lime upon phosphates, we may now return to our main theme—phosphates.

The Price of Phosphate in New Zealand.

Attention has recently been drawn to the fact that crude ground phosphate can be purchased in America for about one-fifth of what it costs in New Zealand. The corollary to this statement is that New Zealand farmers spent last year at least £72,000 more on guano and phosphate rock than they would have done at the cheaper rate. I do not think that fertilizer-vendors here as a whole have much to do with this state of things. They have, of course, to pay the price demanded by the producers who control the deposits beyond New Zealand shores. Several firms who vend fertilizers even assert that they do so merely as a side line (practically without profit) in order to keep their farming connection together.

More than ten years ago, in my annual report to the Secretary of Agriculture (1903, p. 4) I made the following suggestion: "I consider it highly desirable that a systematic search should be made for a phosphate-field on Crown lands, in order that the Government may be able to manufacture and supply a phosphatic fertilizer at cost price, and thus enable our poorer soils to be profitably worked. This policy is entirely analogous to that actually carried out in the treatment of farm animals by the Department, which supplies medicines at cost price to the farmers. In the above case it is the soil which requires medicine." The idea of a Government supply of phosphates to farmers is thus no new one. The need has merely become more pressing with time, but it is not yet generally realized that, based on last year's figures, we are spending at the rate of half a million sterling per annum on artificial fertilizers, or one-half as much as we spend on education. It might be urged that a fertilizer made by merely grinding phosphate rock is an insoluble one, and that this might not be so suitable as more soluble phosphates for North Island soils. If, however, field experiments prove beyond doubt that soluble fertilizers are needed, there is no reason why they should not also be manufactured and supplied under the same system. To make superphosphate sulphuric acid is required, and this is made from sulphur, which is found in New Zealand, or it could be imported from Japan, America, or Sicily.

The World's Phosphate-supply.

Deposits.

Dr. Hopkins states that the phosphate deposits of the world thus far discovered are estimated to furnish from 200,000,000 to

500,000,000 tons of high-grade phosphate rock, which at the rate of 5,000,000 tons a year will be expended in a hundred years. Hopkins calculates that the corn crop of the United States alone requires as much phosphate as is annually produced by the United States. Dr. H. W. Wiley, the Chief Chemist to the United States

RESULT OF MANURING SWEDE TURNIPS WITH POTASH AND NITROGEN.

To be studied in conjunction with illustration on page 117.

The centre two drills received ½ cwt. of potassium sulphate and ½ cwt. of ammonium sulphate per acre (containing two of the essential plant-foods), yielding 1¾ tons per acre. The superior growth on either side is due to phosphatic manuring, 1 cwt. to 2 cwt. of basic slag on one side and 2 cwt. of superphosphate on the other, producing a 30-ton crop.

Department of Agriculture, in 1890 estimated that the corn crop annually required one million tons of phosphoric acid (equivalent to about 3,600,000 tons of 60-per-cent. phosphate rock), and we have seen that America in 1908 produced only 2,300,000 tons of phosphate

rock. We can now understand why countries intent on developing agricultural industries should not be anxious to export phosphates from their own territory, but rather to import them. America and Norway are examples of countries which have adopted legislation restricting the export of phosphates.

Store in the Soil.

The greatest store of phosphates is, of course, that naturally occurring in the soil. Some idea of the amounts thus present may be obtained by assuming that the weight of an acre of average soil containing, say, 0·075 per cent. of phosphoric acid to a depth of 9 in. is 2,000,000 lb. Then there will be in this acre, well within the reach of plants, 1,500 lb. of phosphoric acid, which is equivalent to nearly 3 tons of phosphate rock. Of course, most of this phosphate is present in a form which is not immediately available for plants. It should be the aim of good farming to make this available, and the chief methods of accomplishing this are by studying—(1) the humus-content of the soil, (2) the lime-content, and (3) the water-content.

Composition of New Zealand Soils.

During the past five years I have reported on 488 soils, the analytical results of which have been published in the *Journal* and in the annual reports of the Department. These have been examined for available mineral plant-food by the method first described by Dr. Bernard Dyer, the well-known agricultural chemist. This method has been adopted by most British agricultural laboratories as the best available. In addition, the amounts of total nitrogen and phosphoric acid are given, and I have taken 0·10 per cent. as the limit below which a soil should be termed deficient in nitrogen, although some may consider this rather a severe standard to adopt.

Before proceeding to generalize on the figures below, one word of caution must be given as to the origin of these samples. They are a miscellaneous selection, collected by farmers, experimentalists, and officers of the Department from many sources for various purposes, but not for the purpose of this paper. There is only this assurance, that they are genuine New Zealand lowland soils, taken with more or less care, and with a genuine desire on the part of the sender to learn something of their composition. Probably most of them have had but little, if any, artificial manuring.

CLASSIFICATION OF SOILS ANALYSED.

District (Number of samples analysed, in brackets).	Rating.	Available Plant-food, determined by B. Dyer's Method, modified by A. D. Hall. Potash (K_2O).	Phosphoric Acid (P_2O_5).	Total Nitrogen.	Number of Soils analysed.	Rating (Maercker).	Total Phosphoric Acid (P_2O_5).
		No. of Samples.	No. of Samples.	No. of Samples.			No. of Samples.
Southland and Otago (95) ..	Deficient ..	1	3	3	70	Poor	..
	Normal ..	18	21	14		Medium	13
	Good	76	71	78		Normal	17
						Good	29
Percentage deficient ..	..	*1*	*3*	*3*		Rich	11
						Percentage deficient	*19*
Canterbury (41)	Deficient ..	..	3	3	31	Poor	..
	Normal ..	4	8	5		Medium	2
	Good	37	30	33		Normal	19
						Good	10
Percentage deficient ..	..	*Nil*	*7*	*7*		Rich	..
						Percentage deficient	*6*
Westland (32)	Deficient ..	3	12	4	10	Poor	3
	Normal ..	11	2	6		Medium	3
	Good	18	18	22		Normal	4
						Good	..
Percentage deficient ..	..	*10*	*40*	*13*		Rich	..
						Percentage deficient	*60*
Nelson and Marlborough (37) ..	Deficient ..	..	11	1	20	Poor	..
	Normal ..	5	6	4		Medium	6
	Good	32	20	32		Normal	7
						Good	6
Percentage deficient ..	..	*Nil*	*30*	*3*		Rich	1
						Percentage deficient	*30*

Wellington (123)	Deficient	3	40	5	90	Poor	7
	Normal	36	36	10		Medium	32
	Good	84	47	108		Normal	28
						Good	11
Percentage deficient		2½	*33*	*4*		Rich	12
						Percentage deficient	*43*
*Taranaki (12)	Deficient	..	1	..	7	Poor	..
	Normal	2	3	..		Medium	..
	Good	10	8	12		Normal	1
						Good	4
Percentage deficient		*Nil*	*8*	*Nil*		Rich	2
						Percentage deficient	*Nil*
Hawke's Bay (27)	Deficient	..	16	..	16	Poor	..
	Normal	3	4	1		Medium	7
	Good	24	7	26		Normal	3
						Good	5
Percentage deficient		*Nil*	59	*Nil*		Rich	1
						Percentage deficient	*44*
Auckland (121)	Deficient	4	79	10	80	Poor	26
	Normal	24	17	14		Medium	20
	Good	93	25	97		Normal	18
						Good	12
Percentage deficient		*3*	*65*	*8*		Rich	4
						Percentage deficient	*57*

CLASSIFICATION OF SOILS BY PLANT-FOOD PERCENTAGES.

Maercker's Rating.

Grade of Soil.	Phosphoric Acid.	Nitrogen.
Poor	Below 0·05	Below 0·05
Medium	0·05–0·10	0·05–0·10
Normal	0·10–0·15	0·10–0·15
Good	0·15–0·25	0·15–0·25
Rich	Above 0·25	Above 0·25

Rating adopted for Available Plant-food, as determined by B. Dyer's Method.

Grade of Soil.	Potash.	Phosphoric Acid.
Deficient	Below 0·005	Below 0·01
Normal	0·005–0·01	0·01–0·015
Good	Above 0·01	Above 0·015

* Very few soils from Taranaki have been analysed. Further data may alter considerably the position of this province in the table.

Of the 488 soils classified in this table only 11, or less than 2½ per cent., were deficient in available potash; 26, or about 6 per cent., were deficient in nitrogen; but 165, or over 34 per cent., were deficient in available phosphoric acid, and 33 per cent. were deficient in total phosphoric acid.

Judged by these figures, the richest soils are to be found in Southland, the figures for which are combined with those of Otago; but it may be said that of eleven Southland soils none were deficient in any essential constituent. Coming northward, the soils, broadly speaking, became increasingly poorer in available and total phosphoric acid, and this statement becomes absolutely true if we eliminate soils from the abnormally wet districts of Westland and Taranaki. It looks almost as if the phosphate-content might be a

EFFECT OF PHOSPHATES ON PASTURE. [*Photo by B. C. Aston.*

The field on the left-hand side of the picture was top-dressed with basic slag. The field on the other side of the fence received no phosphatic dressing.

function of latitude, especially when it is remembered how rich the rocks of the Subantarctic Islands are in phosphate. One point which must not be lost sight of in considering the phosphate-content of the different districts is that the average soil is, broadly speaking, warmer as the Equator is approached, and therefore the bacterial life is more active. Hence the rate at which the unavailable plant-food becomes available is quicker in the North than in the South, a fact which materially discounts the advantage of southern soils in their superior food-content. Nevertheless the most populous area of this island dominion is so largely dependent on a cheap supply of phosphate for the successful settlement of its lands that any curtail-

ment of that supply is bound to affect the prosperity of the northern province.

I know that this soil-record is most imperfect, but I have done the best with the material to hand, and I hope that the presentation of the above facts will emphasize the importance of further research and of concentrating our attention in the direction of phosphates, which, it seems probable, may ultimately become the the limiting factor in agriculture.

Soil-surveys necessary.

I have always thought that a more extended study of New Zealand soils would be of great benefit to the farming community. In practice it will probably be found that each type of soil requires some modification of treatment. The accurate delimitation and enumeration of the types of soil in New Zealand will become possible only after a soil-survey of the lands under occupation has been made. In the meantime field experiments will doubtless be carried out under divers controlling bodies without any reference to the type of soil experimented on. Many farmers will rightly continue to doubt the applicability of the results of those experiments to their own soils until they have had an opportunity (which may never occur) of trying the experiments themselves; whereas under a proper system of soil-surveys any farmer's soil could be referred to the proper type, and definite advice given with much greater certitude than is possible at present.

Function of Phosphates.

In conclusion, it should be said that phosphates perform very definite functions in the soil, some of which are given below.

(1.) They supply plant-food; but phosphoric acid must be very deficient in a soil before plants will refuse to grow in it. A plant will produce a large amount of green matter on a very small phosphate-supply, and the plant is not apparently affected in its vegetative stage by this shortage of food, for it does not present any strikingly abnormal appearance, as do plants which turn yellow or red when starved in their nitrogen or potash supply. What does happen, however, is that the beast which tries to produce bone and flesh on the phosphate-starved grass fails, and this may be the first indication the farmer receives that his pasture needs a phosphate dressing.

(2.) Phosphates greatly stimulate root-action. Every farmer knows how important it is to stimulate turnips past the fly stage

with a dressing of superphosphate and other phosphatic manures, but few know that the turnip-plant actually absorbs but little of this generous phosphate manuring. The phosphate is acting indirectly, and most of it remains in the soil. The great effect of phosphate on young plants is due probably to its stimulating action on the root-system. (Hall has suggested that the paramount influence of phosphates on dry Australian wheat soils is due to the stimulating influence, quickly enabling the plant to get its roots down into a moister stratum.) The turnip is a shallow-rooted plant with a feeble root-system, hence the necessity for root-stimulant. The beneficial effect of phosphates will be seen in all crops with inferior root-systems—*e.g.*, mangel, rape, kohl rabi, cabbage, Jerusalem artichoke, sugar-beet, silver-beet, kale, and of its class, barley.

(3.) Phosphates have a most beneficial effect on all clovers and leguminous plants. By this means a store of nitrogenous humus is made in the soil, and this highly increases the fertility. The improvement of poor pastures by phosphates is probably the most important function that phosphates exercise on the poorer soils of New Zealand, which are usually deficient in humus.

(4.) The feeding-value of all crops and pastures manured with phosphates is materially increased. Stock know this, and will forsake an unmanured area for a very small area dressed with phosphates. I cannot refrain from quoting a farmer's letter which I recently received, and which will, perhaps, appeal to you more than merely technical matter. "In the month of April last year I top-dressed 5 acres with slag at the rate of 4 cwt. to the acre, and then shut the paddock up till July, when the first of my cows came in. At the time the slag was sown the herbage was quite short, and although the growth made during the time it was shut up was not a great deal, still the expression of the cows' faces indicated how keenly they enjoyed the taste of it when they were first put on."

(5.) Phosphates hasten the maturing of crops—an important point when these are grown in uncertain climates.

(6.) Phosphates may be given direct to animals as an animal-food and will be so assimilated. Numbers of experiments by competent investigators have proved that a lick containing phosphates enables an animal to thrive when phosphate is so deficient in the diet that "control" animals under the same conditions—that is, fed on the same ration without the lick—failed to develop normally.

There are yet a considerable number of points in connection with the subject to which I should like to refer, but time does not permit of doing this at present.

THE HOMESTEAD BEAUTIFUL.

W. C. HYDE.

"CLOSER SETTLEMENT" being the slogan of to-day it is not surprising to see new homesteads springing up on every hand on the hills and in the dales of this land of "The Long White Cloud." To protect the new home and to make it convenient and attractive, while disposing as quickly as possible of those inconveniences which make life in the country unattractive, especially to our womenfolk, and which lay the foundation of that distaste for the country life which is so much in evidence, should be one of the first cares of the settler. To assist him in this important but much neglected phase of land-settlement these notes are penned. They are not for the lover of the ornate garden, as they indicate only that irreducible minimum which will secure efficiency and plain utility at the lowest possible cost to make and maintain.

When analysed every homestead is made up of most, if not all, of the following components: the house, outbuildings, vegetable-garden, orchard, drying-green, lawn, flower-garden, drive and paths, and a very obtrusive wood-pile. The whole is usually embraced by a more or less effective shelter-belt. Let us endeavour to achieve success in each department and link up all in a convenient manner, even if we may have to postpone the carrying-out of a part of the scheme till time and circumstance permit, thus realizing that harmony which is beauty in its truest sense, and carries with it due economy in space, cost, and labour.

The accompanying illustration is of the new home of a settler in the Rangitikei County—selected at random—and it will serve as a type. The illustration represents the ground-plan of the suggested arrangement. The house is on a hillside sloping to the sun—the north. Parallel with it, and at the foot, runs the main road, from which the house stands some distance back. Bad weather comes up from the south and west.

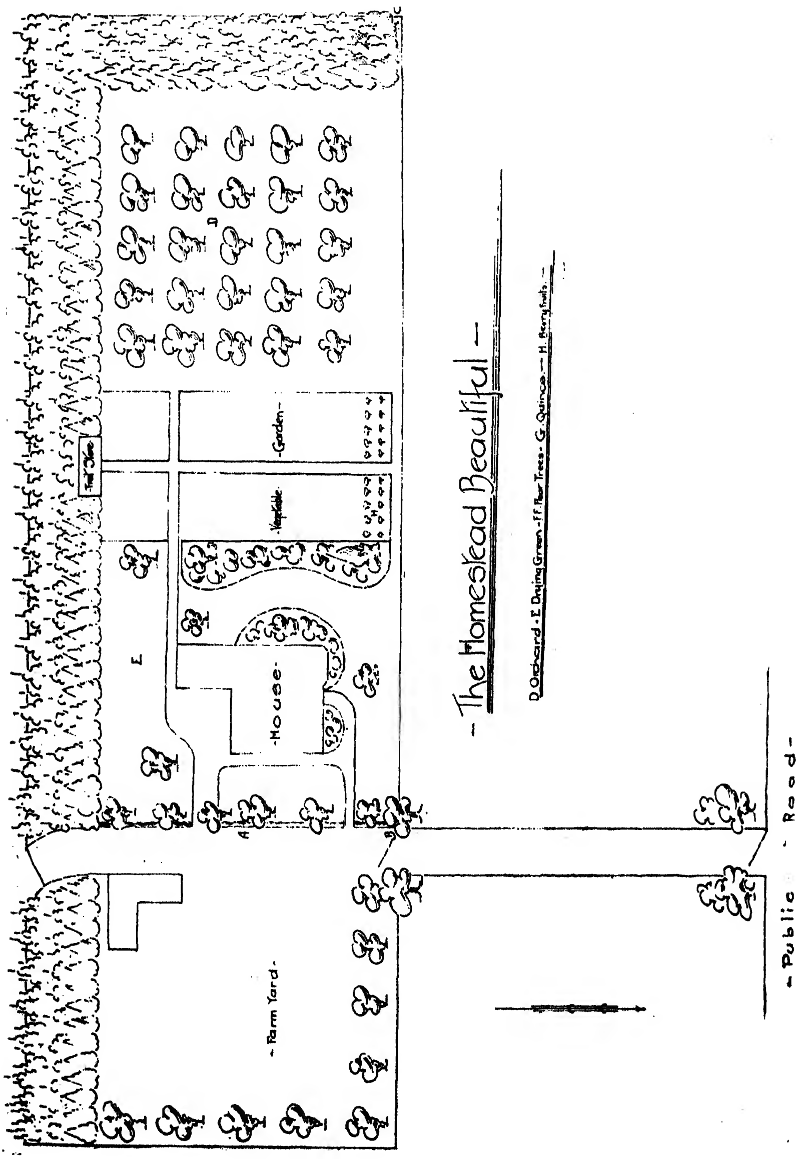
The first business is to erect a substantial wire ring fence round the buildings, with gates as shown in the plan, and such others as may be required. A better job will be made if, in the fence "B" to "C," steel droppers be used instead of wood. This would make it less conspicuous and allow the house and grounds

to "blend" with the surrounding country, of which they should appear, as they are, a part. A hedge or conspicuous fence here gives a sense of repression and confinement, which should be avoided, while the invisible fence gives a sense of generous spaciousness and allows what is often one of the most attractive features about a homestead—the vistas which lie beyond—to be seen with ease and at best advantage. The only transverse fence is that marked "A" on the plan. It should be substantial, as it is permanent. The space thus enclosed must depend upon individual requirements. In the instance taken as an example it is 2 acres.

Next come the roads and paths. To grade them properly, form water-tables, and put in suitable culverts are genuine economies. One may as well tip road-metal over a cliff as put it on an unformed or half-formed road; while nothing makes so much for cleanliness and convenience (and a good-humoured housekeeper) as paths and walks round a house which are hard and dry.

The plantation shelter next requires attention, and far more attention than is generally devoted to it. How important a factor it is in the success of an orchard is well known. Is it always realized that it is just as important to the well-being and comfort of other vegetation and of stock as well as that of the human beings residing in its grateful lee? Of course, this applies more especially to those members of the family whose duties confine them to, or round about, the house. Let it then be made more ample than we usually see it—deeper and longer. Its purpose should be fully realized, and much more quickly than generally, for the units which compose a plantation grow more quickly when planted in larger numbers, as they assist and shelter one another. Pines (*Pinus*) and cypresses (*Cupressus*) are generally most useful for this purpose. The cypress known as Lawson's (*Cupressus Lawsoniana*) is specially useful for planting as the inside row, because it is of moderate ultimate height, well foliaged to the ground, attractive, and hardy. The taller and more vigorous pines should be planted on the out or weather side. Gums (*Eucalyptus*), wattles (*Acacia*), and poplars (*Populus*), &c., are also useful in certain localities for this purpose.

Supposing, then, it is decided to set aside half a chain along the southern and western boundaries, as shown in the plan. We have room for two rows of pines and one row of Lawson's cypress. The following system of planting is recommended: Three sighting-rods, such as ploughmen use, should be set up to mark a line about 6 ft. from the boundary-fence. Take a spade that is bright and keen, and along this line skim the turf off a patch 2 ft. square


- The Homestead Beautiful -
D Orchard · E Drying Green · F.F. Flowr Trees · G. Quince. — H. Berry fruits. —
D
E
A
-House-
-Vegetable
-Garden-
- Farm Yard -
- Public · Road -

about every 6 ft. (two spade-lengths), disposing of the turf in such a manner that it will not prevent the proper use of a scythe later in the season. Having completed a row in this manner, work back, planting pines as you go. Break up the earth exposed, then thrust the spade deep in the middle of the skimmed portion; then first depress the handle backward, lift a little, and bring the handle smartly forward. In the space behind the spade let an assistant, who is carrying the pines, place a plant. After withdrawing the spade, press the ground round the plant thoroughly with the heel. When one row is thus finished, remove the sighting-rods and place them in line about 9 ft. (three spade-lengths) from the last row, and proceed as before. This process is continued until the plantation is completed. All the future attention necessary will be to scythe-mow the grass annually, when if the grass be heavy it will be as well to remove it.

The portion set aside for the orchard and vegetable-garden should be prepared thoroughly with plough and harrows. If required, a list of fruit-trees known to thrive and crop well in any locality, together with details as to spraying and pruning, &c., can be obtained from the Orchard Instructor for that district. The shed shown on the plan between the vegetable-garden and the plantation will be found very suitable for a fruit-store, as it will have a cool even temperature, if built properly. It will also be convenient for storing seeds and garden tools.

The lawns around the house may next receive attention. From our present point of view the original grass may be allowed to remain. If there be any lumps or hollows, the turf should be systematically peeled back and soil removed or the hollow filled, as the case demands, and the original turf replaced. In filling the hollows care should be taken to make the soil firm. Any minor depressions may be filled by top-dressing with soil in early spring. The shrubberies adjoining the lawn should be marked and then cut out. The land should be trenched or deeply dug, and the turf thoroughly disposed of. The shrubs as well as the shade and specimen trees shown elsewhere on the plan should be those for which one has a preference and which observation has pointed out as being naturally suitable for the locality. Along the transverse fence "A" prepare a strip about a yard wide by careful digging before planting the hedge. This strip of ground should be kept free from all growth till the hedge is thoroughly established. The planting of a few trees in the angles of the paddocks through which the homestead is approached will effectively "break up" what might otherwise be the rather monotonous straight line of the northern boundary.

The proper condition of the immediate surroundings of the house may be maintained by the use of a cheap runabout lawn-mower and a hoe. An occasional application of "weed-killer" on the paths would be beneficial. Attended to systematically the work is never arduous, and, as a result, the appearance is always clean, wholesome, and attractive.

The labour of the vegetable-garden can be lightened considerably by the use of the hand seed-drill and cultivator. These machines do excellent work on land in fine tilth.

Such an arrangement can be carried out at a cost very little, if any, more than that of the resultless efforts which are sometimes seen. It will be found compact and permanent, and the returns in fruit and vegetables as well as the advantage of general convenience will handsomely repay the whole expenditure. It will also add to the health and longevity of all stock "dead and alive" by affording shelter and shade. By its cleanliness and convenience it will make housework light. Also, the ample orchard and garden supplies will make for economy and satisfactory house-keeping, and the harmony of the whole arrangement will create a charm which should make home all it ought to be, so that its members will be attracted instead of being repelled. It is the cheapest and one of the most valuable improvements which can be put on a farm.

Each farm is in a sense an experiment station, and the experiences of the individual farmers are of great importance in formulating wise plans of farming.

After consideration of the elements of the problem of increasing cost of food, it is plain that the farmer is not getting an exorbitant price for his products, and that the cost of distribution from the time of delivery at destination by the railroad to delivery to the consumer is the feature of the problem which must present itself to the consumer for treatment. Why do not the consumers buy directly from the farmers? The distribution of farm-products in this simple way has already begun in England, where co-operative organizations of farmers are selling by direct consignment to co-operative organizations of consumers in cities. —*Year-book of the United States Department of Agriculture.*

THE most valuable knowledge the farmer can possess is to understand the soil that is under him, and his most important duty is to maintain the fertility of that soil.

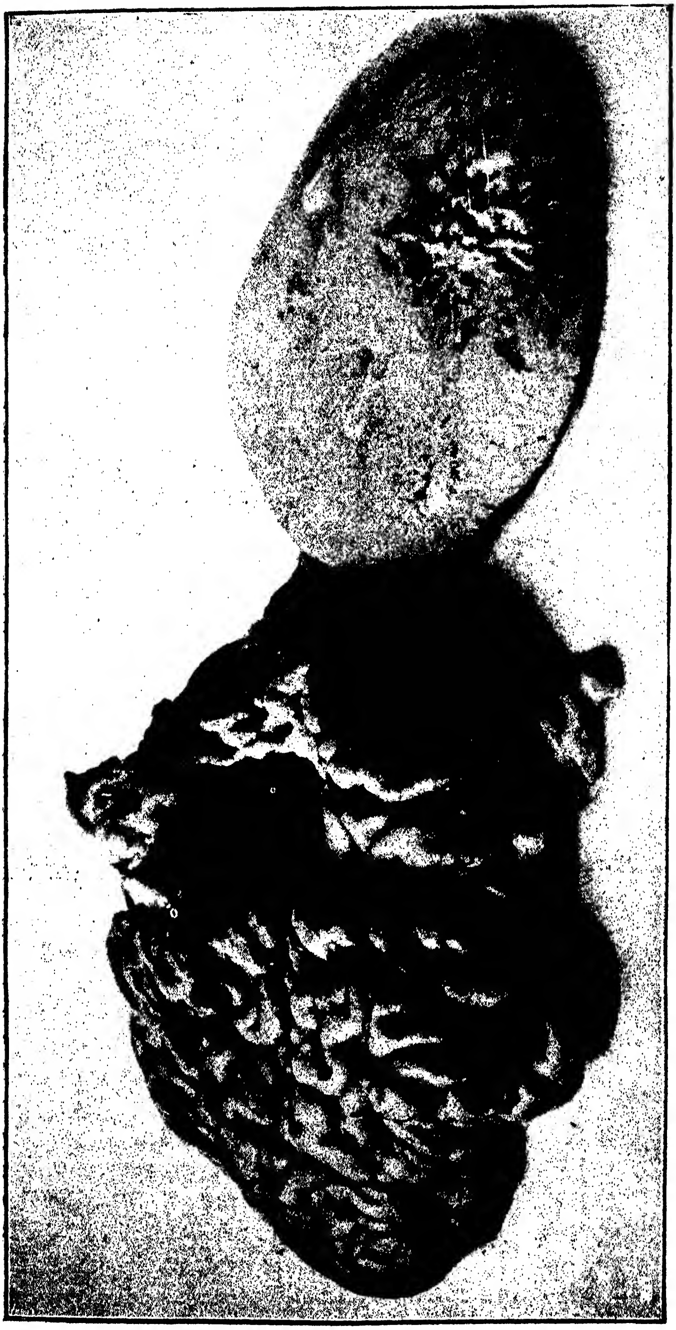
PARASITIC CYST IN THE BRAIN OF HEIFER.

H. A. REID, F.R.C.V.S., ETC.

THE accompanying illustration depicts the result of the development of a hydatid cyst in the brain of a three-year-old heifer. About six months ago the animal was noticed to present certain abnormal symptoms, consisting of more or less erratic movements and a tendency to incline the head to one side. These symptoms were not pronounced, and a general examination failed to reveal any definite cause. Later on characteristic movements became more marked. The heifer walked in circles from left to right, the eyesight appeared to be defective, and, in consequence of not being able to obtain its feed readily, considerable loss of condition took place.

Further examination proved that the animal was practically blind, although no structural alteration in the eyes could be observed. There was never any bulging or softening of the cranial bones, nor any pain evinced on pressure over this region. The case was diagnosed as one of brain-pressure involving the optic tracts, probably resulting from cystic growth. Post-mortem examination showed congestion of the blood-vessels of the brain, and revealed the presence of a hydatid cyst occupying the lateral ventricle of the right hemisphere, extending into the forebrain. The cyst-wall was composed of greyish-white fibrous tissue, studded with yellow, granular-looking material. The cyst with its fluid contents was about the size of a goose-egg, or considerably larger than that generally recorded in cases of this condition.

Hydatid disease of the brain, commonly called "gid" or "sturdy," usually affects lambs or hoggets. The condition is comparatively rare in cattle. It represents the bladder-worm stage of a tapeworm of the dog (*Tænia cœnurus*), and the cyst is technically termed "*Cœnurus cerebralis.*" The dog becomes infested with the tapeworm through eating the heads of sheep affected in this manner. Segments of the parasite are passed by the dog, and these decompose on the ground, setting free the contained ova. The ova are taken in by the intermediate host, sheep or cattle, as the case may be, and undergo another stage of development, becoming embryonic worms armed with a circlet of six hooks. They pass through the walls of the stomach or intestine, gain access to a blood-vessel, and are then distributed throughout the system. The embryos conveyed to the nervous tissue continue to develop into the cystic or hydatid form already described, of which the case in point affords an excellent example.



Brain. Cyst.

Parasitic Cyst in the Brain of Heifer.

DAIRY-FARMING.

PRIMROSE McCONNELL.

FEEDING AND GENERAL TREATMENT.

THERE is no animal more capable of improvement than the cow, and the produce of the dairy increases in proportion to the attention she receives. Her produce may be doubled by judicious treatment, and yet the advantage accruing from attention to minute particulars is often ignored. A case in point is the dairy herds of South Derbyshire, where, by judicious treatment and a more liberal system of management, milk-yields during the past few years have been increased to the extent of 200 gallons per cow per annum, which for farmers who are engaged in the milk retail trade means a yearly increase of at least £10 per cow.

As a proof of the value not only of liberal feeding but also of a change in the nature of the feed, it may be permissible to state what has this season been the experience in this connection at the Ruakura Farm of Instruction. By the middle of March many of the cows were decreasing in their milk-yield to the extent of about 10 lb. weekly, and the whole herd was then moved on to a paddock of barley and tares which had been sown as a catch-crop. The effect was magical, there being a phenomenal increase in the milk-yield even from cows that had already been milking eight months. In some instances the increase was to the extent of 8 gallons per cow per week, and, what is still more remarkable, the percentage of butter-fat was also very considerably increased. I may state that the milk at Ruakura is carefully weighed twice a day, and the test for butter-fat carried out semi-officially and privately once a month, so there is no possibility of a mistake. A Shorthorn cow, eight months calved, increased from 186·8 lb. of milk to 249·2 lb. per week; a Shorthorn two-year-old heifer, eight months calved, from 100·6 lb. to 141·3 lb.; a Shorthorn two-year-old heifer, eight months calved, from 99·5 lb. to 153·9 lb.; a Shorthorn two-year-old heifer, eight months calved, from 99·1 lb. to 141·8 lb.; a Shorthorn cow, seven months calved, from 142·8 lb. to 206·5 lb.; a Shorthorn cow, six months calved, from 149·5 lb. to 197 lb.; a Shorthorn cow, six months calved, from 218 lb. to 282·6 lb.; a Shorthorn cow, two months calved, from 228·7 lb. to 313·4 lb.; a two-year-old Jersey heifer, eight months calved, from 86·6 lb. to 110·3 lb.; a two-year-

old Jersey heifer, seven months calved, from 88·8 lb. to 117·7 lb.; a Jersey cow, eight months calved, from 98·8 lb. to 130·7 lb.; a Jersey cow, eight months calved, from 83·1 lb. to 101·5 lb.; and even from cows that were practically dry previous to the change there was a substantial increase.

Now, everybody knows how easy it is to decrease the milk-yield and how difficult it is to increase it, especially towards the end of the season, and I submit the above facts as undeniable proof of the value of liberal and judicious feeding. The increase, I may state, was sustained for ten successive weeks, and it can readily be realized what this would mean in a herd of a hundred cows. I find that a decrease under unfavourable conditions may be almost instantaneous, but an increase is brought about only by very favourable conditions, and it takes about a week to obtain the full effects of a favourable change. It must also be taken into consideration that not only will such feeding pay directly for all costs in connection with it, but such a crop as tares will have a very beneficial effect on the following crop; also by lengthening the period of lactation the milk-glands are stimulated and increased in their capacity for milk-production. It is a well-known fact that the longer the milk-flow can be maintained during a heifer's first period of lactation, the more her capacity for milk-secretion is increased; whereas if she be dried off while still giving a fair quantity of milk, depend upon it she will be dry about the same time the following season. Even massaging the udder, and continuing to go through the action of milking after all the milk has been drawn, will tend to increase the flow—although it can never make a bad milker into a really good one.

I think that just a little too much is made of the fact that it is wise to give the cows a spell between their periods of lactation, and I sometimes wonder whether it is the cow or the owner that is most anxious for a rest. My own experience is that if cows be fed well they require very little rest. Under ordinary circumstances the quantity of milk which a cow gives is in direct proportion to the quantity of food which she consumes over and above the maintenance ration, *up to the limit of her inherent milk-making ability.* If she eat more than this amount she stores it upon her body in the form of fat, to be given off later when her milk-making powers call for more material than her daily rations supply; if she eat less, either she robs her body or lessens her milk-yield, or both. It has been abundantly proved that the great milkers are great feeders, and yet they produce milk much more economically than the small eaters. Ten good cows will yield as much as twenty inferior ones, but the latter consume twice as much food for maintenance purposes.

Now, I think, it will be granted that it would be absurd for a farmer to attempt improving his herd by increasing its milking-capacity if he did not also provide the necessary increase of food, and in all my experience I have never yet come across a farmer who regretted providing extra feed for his cows. Of course, in some instances I admit that there is a difficulty in providing food other than grass, but such cases are the exception and not the rule; and it is a most deplorable and disgraceful fact that in many cases where abundant supplementary fodder could easily be provided cows actually die from starvation. An owner of a hundred cows may look upon the death of one or two as nothing serious. Neither would it be did that happen under ordinary circumstances, but if they die from sheer starvation their death assuredly points to enormous losses in the future, for it is a certainty that the milk-yield from the whole herd will be only about half what it would have been under liberal treatment.

A cow which possesses inherent milking-qualities cannot possibly be in too fit condition at calving, for if she carry any surplus fat it will soon go into the milk-pail. I can find some excuse for the man who pinches the "boarder" or "robber" cow, but to starve one of high milking-capacity is, in my opinion, nothing short of criminal: it is on a par with starving one's greatest friend. If a farmer be so circumstanced that he cannot use a plough, he may greatly increase the carrying-capacity of his pastures by judicious top-dressing; and he may still further increase it by dividing his paddocks into small areas, so that the stock may be repeatedly moved on to fresh ground. This plan will undoubtedly be developed greatly before long, for the dairy cows respond as readily to such a system as sheep stock, and under such conditions the carrying-capacity of the pastures would be greatly increased. The soiling system has not made much progress in New Zealand on account of the high price and scarcity of labour, but I am quite certain it will be greatly developed in the near future, and even now I am convinced it would pay handsomely if gone about in the right manner.

I have on another occasion dealt with the value of lucerne as a fodder crop, and further experience only heightens my opinion of this wonderful plant. There is no danger of cows dying from starvation where a good paddock of lucerne exists. Failing this, a stack of ensilage held in reserve is as good as money in the bank. In making provision of this sort we are too apt to look at the *immediate* expense, forgetting the enormous loss that would be brought about by carrying on a "hand-to-mouth" system, and by failing to make a liberal provision not only for the present, but also for periods of scarcity that may occur in the future. In the North

Island, generally speaking, fodder crops of one sort or other may be grown in the average season all the year round, and to be completely successful in growing fodder crops the sower should tread on the heels of the reaper. Failing lucerne, these may include tares and barley, tares and oats, tares and rye, or Western Wolths grass and clover, sown in the autumn for early spring use, followed by such crops as silver-beet, chou moellier, and maize, then followed again by tares and barley or oats, which in this instance should be a catch-crop; and winter may be confidently faced by providing a few acres of mangels and hay, or even periodical sowings of the tares and barley. It must be remembered, however, that such crops as Western Wolths grass, chou moellier, and maize soon exhaust the soil unless they be treated liberally in the matter of manure. But if a dairy-farmer have a considerable area of lucerne he will require few, if any, of these crops I have mentioned, because the lucerne will supply him with abundance of green feed in the summer and the best of hay in the winter.

During the past few months a number of reports have come to hand giving details of success or failure in attempts to establish lucerne; and in every instance, without exception, where failure has been reported it has been traced to neglect in carrying out instructions as to cultivation, inoculation, manuring, &c.; on the other hand, the success being achieved is beyond expectation. Doubtless in the near future the labour of handling forage crops will be much lessened by the introduction of suitable labour-saving machinery, and it is much to be regretted that New Zealand implement-makers are so indifferent anent this very important matter. When cows are being fed with green fodder they should receive a full ration, and should not be allowed to depend partly on that and partly on the pasture, for under such a system the cows will ignore the pasture and spend half their time hanging round the gateways awaiting their next supply, and the result of their unsettled condition will in all probability be a decreased instead of an increased milk-yield.

COW-TESTING.

Now a word as to cow-testing, which is undoubtedly the most valuable movement the dairy world has experienced, and the cost is next to nothing. A dairy-farmer possessed of the butter-fat tester and milk-scales (and no farmer can afford to be without them) has the only infallible gauge of the milking-capacity of his cows, and, although conformation may often convey a wrong impression, the verdict of the tester and scales cannot be gainsaid if the work be conscientiously and carefully carried out. The most able judges of dairy stock are compelled to confess that they cannot foresee with

certainty the milking-capacity by conformation alone, and even the most careful scrutiny of the milk-yield will be valueless unless the milk be carefully and regularly weighed and as carefully tested. Cow-testing not only makes dairying more profitable, but also makes it more desirable, and creates a keen interest in every member of the herd.

Milk-testing was first introduced in 1895 in Jutland, Denmark. Twelve farmers formed a small society and engaged the services of an expert, who visited the various farms in rotation and ascertained the weight and percentage of butter-fat of each cow's milk. These visits occurred once a fortnight, and the milk of individual cows was tested each visit. From such a small beginning the system spread rapidly over Denmark, Sweden, and Holland, and in Denmark alone there are nearly five hundred milk-record societies. In every instance the movement has been successful, and has resulted in a very marked increase in the milk-yield of the herds so tested. For example, in Sweden the milk-yield per cow has been increased 200 gallons per annum, in Canada by 245 gallons, and in Holland an average yield of 840 gallons has been obtained from one hundred thousand cows, and in almost every case the percentage of butter-fat has been increased. It may be permissible to quote from leaflet No. 5 lately issued by the Department of Agriculture and Technical Instruction for Ireland, the following being an extract from page 3 of the bulletin:—

"Whilst the value of milk-records to every owner is very great, it is in the accumulated evidence and facts derived from a large number of records continued over a series of years that the real national importance of the system for the study of problems underlying the progress of dairying is to be found. The data so collected is of the utmost utility in throwing light upon subjects that have hitherto been largely matters of conjecture. Such problems resolve themselves into three groups, as follows:—

"Group (*a*): Problems of heredity—for instance, to what extent are desirable qualities such as that of heavy milking power and high butter-fat yield hereditary; to what extent does the power of different animals vary in transmitting qualities to the offspring, and how are sires and dams respectively able to transmit milking longevity to their offspring?

"Group (*b*): Questions as to the relative values of the different breeds of cattle as milk-producers.

"Group (*c*): General problems such as—the improtance to be attached to the first lactation period of a heifer; in what breeds is development slow; how often is the good milker of one season the poor milker of another; how does the butter-fat vary during the period of lactation; what effect has age on the butter-fat

yield; what are the years in which quantity and quality are combined to give the more profitable return; within what limits does the system of feeding influence the quality of milk; are large, medium-sized, or small cows the most profitable producers; to what extent do comfort, shelter, and clean, efficient milking influence the yield?

"The evidence hitherto available on these points has conclusively indicated the necessity for more complete information before deductions can be drawn."

The cost of keeping milk-records is very small indeed, and even if it did nothing more than stimulate the farmers' interest in individual members of their herds it would still be an incalculable boon.

HOW NOT TO DRENCH LAMBS.

A WARNING TO SHEEPOWNERS.

C. J. REAKES, D.V.Sc., M.R.C.V.S.

A GOVERNMENT veterinary officer, who recently visited a farm for the purpose of assisting the owner in determining the cause of some mortality which had occurred among lambs, makes the following remarks in his report upon the matter:—

"In conversation with Mr. —— I learned that he had been drenching the lambs with turpentine and linseed-oil, and that nearly all—possibly all—of the deaths had occurred very shortly after drenching; also that he had used a pewter syringe to drench with, and believed in doing it quickly, and with force."

In these days it seems difficult to realize how any man could imagine that to force liquid medicine down the throat through the medium of a syringe is a right and proper way of administering it. It is an excellent way of forcing the liquid into the windpipe and killing the patient, and I have no doubt but that these lambs were in this way killed by the owner. With sheep and lambs, as with other animals, liquid medicine should be given slowly and carefully, a small quantity only being quietly poured into the mouth at a time, and care being taken to pour in no more until that is properly swallowed. The head should be held, by the upper jaw only, slightly above the horizontal line (care being taken not to compress the nostrils), and the tongue left quite free.

STARTERS:

THEIR PREPARATION AND USE.

J. PEDERSEN.

THE value of starters for cream-ripening was first demonstrated by Professor Storch, of Copenhagen, as far back as in 1890. The results of his investigations were published in the Eighteenth Report of the Royal Agricultural Experiment Station of Copenhagen. Professor Storch found that different species of lactic-acid bacteria would produce different flavours in butter. He succeeded in isolating one species, called No. 18, which when used in cream-ripening gave the butter a very fine aroma. Some commercial houses then took up the manufacture of pure cultures for cream-ripening. Among the first of these were Messrs. Blauenfelt and Tvede, whose preparations are favourably known amongst our factories to this day as the "B. and T." cultures.

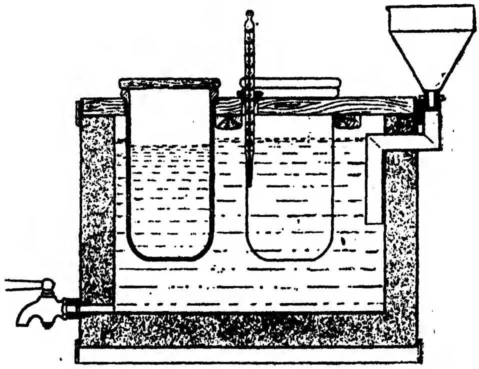
According to Professor Jensen, of the Royal Agricultural College, Copenhagen, the most favourable starter for cream-ripening generally contains two or more species of the lactic-acid bacteria, which are known as "*Streptococci latici.*" They are the main factor in producing that fine aroma so characteristic of choice butter. Most of the commercial cultures contain several species of *Streptococci*, which, it is said, give better results than a single one. They have more resistance and produce more acid. A single species by itself, according to Professor Jensen, is inclined to degenerate or get slimy.

In commercial cultures the germs are inoculated into the medium suitable for their growth. The powder medium generally consists of milk-sugar and starch. Following are the names of the best-known cultures: Chr. Hansen's (Danish); B. and T. (Danish); A. Jorgensen's (Danish—recently introduced); Barnekow's (Swedish); E. Ericsson's (American).

PREPARATION OF STARTERS FROM COMMERCIAL CULTURES.

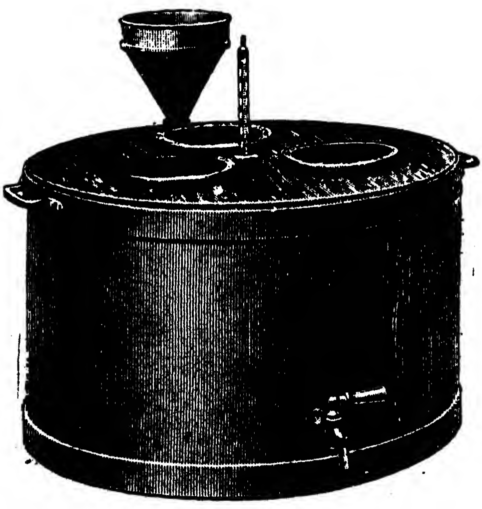
Commercial cultures contain the right species of lactic-acid bacteria. There is no need here to discuss the method of making the so-called home-made ones in the factories. The cultures are sent out in 1 oz. bottles hermetically sealed, containing sufficient

to propagate 2 gallons of milk. In preparing the starter from the culture it is most important to select the best milk available. As new milk is generally used, it is a good plan to pass it through a Uhlander's filter. The most satisfactory way of preparing the milk is in a specially made vessel. The *New York Produce Review* has published good illustrations of one, and these are reproduced on this page. The filter is made by Messrs. Rudelius and Bukland, of Lund, Sweden. It consists of a jacketed and insulated vessel of zinc-plate, with room for three quart, acid-proof, stoneware jars covered with wooden covers. There is a funnel for pouring in hot or cold water, as shown in the illustration. I think it would be an advantage to have steam and cold-water connections instead of a funnel.



No. 1.

It is understood that the B. and T. people are placing on the market an apparatus for the making of the "mother" starter, somewhat similar to that shown in Nos. 1 and 2. It would no doubt be an advantage to have such an appliance in a dairy factory for the purpose. A well-known dairy-supply firm in Palmerston North is the New Zealand agent for the device.



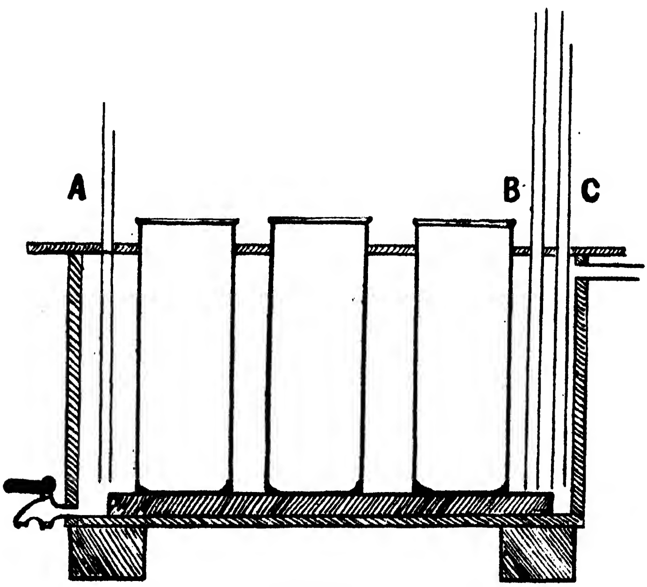
No. 2.

The milk selected for the starter is heated in the jars to between 180° and 185° F. for ten minutes. The hot water is then run off, and cold water turned on until the milk is cooled to 85° F. The powder is then added—the whole of the contents of the bottle should be used. During the first two hours the milk should be stirred occasion-

ally so as to mix the powder thoroughly. After that it should not be disturbed until next morning, when it will have coagulated and will show an acidity of about 0·70 per cent.

Before this starter is inoculated in the second propagation the top layer should be skimmed off and the starter stirred well. The milk for the second propagation is treated in exactly the same manner as above, except that it should be cooled to 75° F., inoculated with 1·5 per cent. of the first propagation, stirred well, and left until next morning.

The third propagation may be handled as an ordinary starter, and, as a rule, it will be found quite satisfactory for using in the ordinary starter.



No. 3.

A, Steam. B, Cold water. C, Chilled water.

PREPARATION OF STARTER FOR DAILY USE.

In most factories the starter-milk is heated in a milk-heater or pasteurizer, and the cooling is done over a cooler. I would recommend the following system, which is shown in the drawing marked No. 3. It consists of a wooden tub holding three or four cans. The cans most suitable are made of tinned copper, somewhat narrow, being about 15 in. to 16 in. in diameter. Each can should hold about 10 to 12 gallons. Two sets of cans are required. The starter-tub is connected with steam, as well as

with cold and chilled water. The starter-milk is heated in the cans by means of the hot water. After the required temperature is reached the hot water is run off and cold water turned on. When the temperature of the milk has been reduced to about 110–120° F., chilled water is used in order to reduce the temperature fairly fast. The cans rest on a 2 in. board on the bottom of the tub in order to circulate the water better. The chief advantages of preparing a starter in this way are as follow:—

(1.) The milk is heated and cooled in the same cans, thereby minimizing the danger of contamination from outside sources.

(2.) It is possible to exercise complete control over the temperatures. This is the most important point in starter-making. In the spring and autumn, when temperatures are low, the starter-milk can be kept at the desired temperature by heating the water in the tub. During the hot weather cold or chilled water prevents the starter from getting overripe. The danger of continually over-ripening a starter I shall refer to later on.

(3.) The starter-milk can be treated as soon as received. There is no need to leave this until after separation is over, as in cases where a heater or pasteurizer is used.

(4.) Considerably less labour is necessary. Only an occasional stirring during heating and cooling is required, besides which there is no cooler and pasteurizer to clean and sterilize.

Heating the Starter-milk.

It is the custom in many factories to heat the milk as nearly as possible to boiling-point for half an hour or longer. Such severe treatment is considered harmful. Professor Jensen recommends a temperature of 176° F. for fifteen minutes. G. Lind, who has control over the making of the cultures at Chr. Hansen's laboratory, also recommends a lower temperature. In "Mejeri-Posten" he advocates a temperature of 185° F. for fifteen minutes. At such a temperature the vegetative germs are destroyed. The destruction of the spores is not so important, as the lactic-acid germs prevent their growth or destroy them. It must also be remembered that the cream, on account of quick pasteurization, always contains more spores than the starter, but, as mentioned before, they are destroyed by the lactic-acid bacteria, and are therefore of no great importance.

It has been found that milk heated to only 180° for ten minutes contains no more bacteria than if kept for two hours or more at a higher temperature. A longer heating only makes the milk

less suitable for starter-making. In fact, such milk has always a strong cooked flavour, and a brownish colour due to a change of the milk-sugar, and therefore furnishes a poor medium for the development of the lactic-acid germs.

ACIDITY OF STARTERS.

We know from experience that a starter is always at its best soon after it has coagulated, or when it is showing an acidity of about 0·80 per cent. It should then be cooled down to about 50° F. Where the starter-tub is in use, this can be done simply by turning on the chilled water. If this system be not in use, the starter is generally left in the butter-room until used in the cream, which is often late in the day, with the result that it constantly gets overripe.

As mentioned before, the most favourable species of bacteria for cream-ripening is the *Streptococci.* It is well known that they produce only enough acid to coagulate the milk. If the ripening process be carried on further, their development is checked, and they are weakened considerably.

It has been found that, if a starter be constantly getting overripe, the rod-shaped lactic-acid bacteria, which are those detrimental to the flavour of the butter, commence to develop. These species are often called *Bacillus Bulgaricus,* as they are used in the production of yoghourt. They produce about four times as much acid as the *Streptococci,* and therefore require a great deal more acid for their development.

An overripe starter will in time become a culture of the rod-shaped lactic-acid bacteria. Such a starter is often clean in flavour, but strongly acidy. It is responsible for the sour flavour in butter. This was clearly demonstrated by Dr. Rosengreen in his investigation into sour flavours in butter.

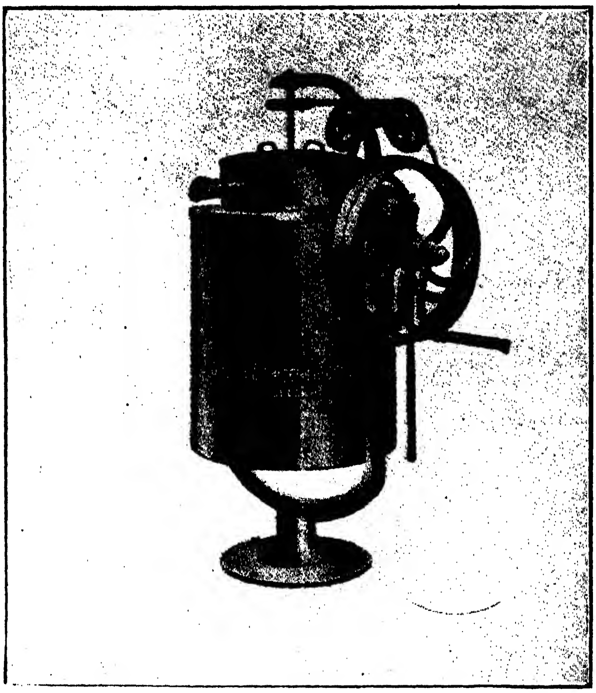
STARTER-CANS.

These are made on the same principle as the starter-tub. They are built like a pasteurizer; the outer jacket is insulated, and has a connection for steam and cold water. The milk is heated and cooled in the same vessel, so that this appliance has the same advantages as a starter-tub. These cans are well made, and take up very little room. They are now used extensively in European factories, where they are well spoken of. As a labour-saving device, and an improvement on the present system of starter-

making, they should appeal to most factory-managers. The cans are made up in sizes varying from 15 gallons to 45 gallons. (See No. 4.)

POINTS TO CONSIDER.

Always select the best milk available. Remember that poor milk means a poor starter. Do not boil the milk so that it gets a brownish colour; a temperature of from 180° to 185° F. for ten to fifteen minutes is quite sufficient.



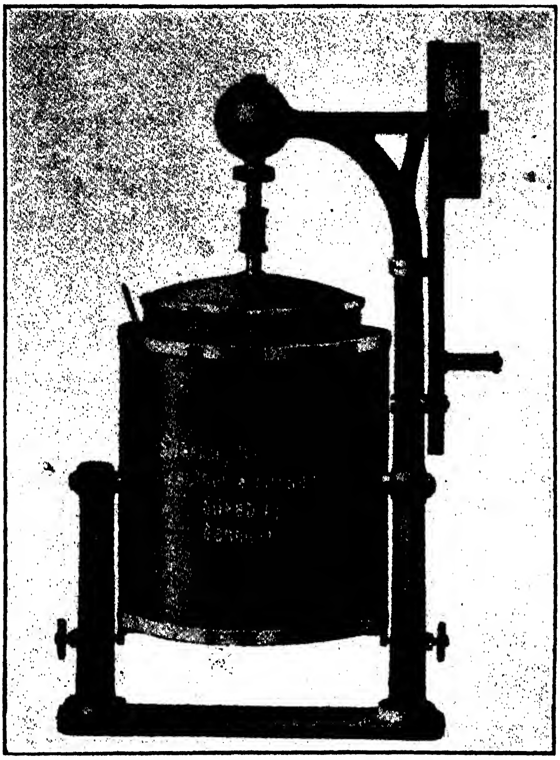
No. 4.

Cover the cans with buttercloth which has previously been dipped in boiling water. Keep a special stirrer, cup, spoon, and thermometer, to be used for starter-making only. Remember to dip them in boiling water before using them, otherwise the pasteurizing process becomes a delusion.

Never sample a starter by dipping your finger into the can; an aluminium cup is provided for this purpose.

Remember to cool down the starter as soon as it has coagulated, generally first thing in the morning. This prevents the starter from getting overripe.

Propagate your "mother" starter in an apparatus similar to that shown in drawing No. 1, and the larger starter in a starter tub or can. On account of the smaller quantity of milk necessary, a "mother" starter can be looked after better, and you have, in addition, three jars to select the best starter from. This is the advantage of propagating a daily "mother" starter as well as the large starter.



THE "SILKEBORG" STARTER-HEATER.

One of the latest appliances for starter-making, equipped for both heating and cooling.

A cow giving a moderate quantity of milk over a full lactation period is a more profitable animal than one giving an abnormal quantity for a few months.

It is important that the dairyman should know which of his cows are good producers and which are kept at a loss, so that the latter may be eliminated and the herd built up with profitable cows

WENSLEYDALE CHEESE.

Miss G. N. Davies, N.D.D.

Wensleydale cheese, like most others, obtained its name from the place in which it was first made—the beautiful dale of Wensley, in the North-west Riding of Yorkshire. When perfect it is one of the best varieties of cheese produced in England.

It is very mellow, rich, finely flavoured, and blue-moulded throughout; in fact, very like Stilton; and when the make is of a uniformly high quality it realizes the same price as the latter. In making it differs from Stilton chiefly in the temperatures, and also in the curd being cut and stirred like any ordinary cheese, and slight pressure applied. For this reason it is said to be a cross between a Stilton and a Cheddar.

The utensils, &c., required are practically the same as for any other cheese, excepting the moulds, which are of Stilton shape and flat.

The smallest cheese weighs as little as 7 lb., whilst the Stilton-shaped often weighs 16 lb.

There are three different kinds of Wensleydale cheese made—(1) The Stilton-shaped Wensleydale; (2) flat Wensleydale; (3) small or miniature Wensleydale. The first-named is the size and shape of a Stilton cheese and is very similar in taste, with the blue mould veined all through, but differing outside or in the coat, the coat of a Stilton being crinkled, whilst that of a Wensleydale is comparatively smooth, with lines or marks running round the cheese where the bandage has been stitched. These cheese take from five to six months in which to ripen.

The flat Wensleydales are made in different shapes and sizes, but are rather flat and round, the cheese being mild because there is little acidity present. They are sold green or when two months old, and no blue mould is developed.

During recent years the miniature Wensleydale has had a large sale. It is, like the Stilton Wensleydale, made on a small or miniature scale. Little acidity is developed, and very little pressure applied; in fact, it comes under the heading of "soft" cheese. These cheese sell readily owing to their convenient size. If kept long enough and sufficient attention be paid to them, they will

develop blue mould, but the tendency is to go dry, owing to the time they have to be kept and the small size.

Method of Manufacture.

Stilton Wensleydale.

The milk, after being strained into the vat, is regulated to a temperature of 84° F., the acidity being 0·2 per cent.

Renneting.—Rennet is added at the rate of 1 dram to 4 gallons of milk, or 3⅛ oz. per 100 gallons. The time taken for the rennet to show effect is usually fifteen to twenty minutes.

Cutting.—The usual period of coagulation is about sixty minutes, after which the curd should be cut with "Cheshire" knives.

Stirring.—After removing a little curd from the tap (which should also be done after adding the rennet) and cleaning the sides and bottom of the vat, stir normally for twenty minutes, then raise the temperature slowly, 1° in five minutes, to 88° F.

Pitching.—After the temperature has been raised to 88° F., stir for about five minutes, and then leave to "pitch" or lie in the whey for about twenty minutes until the curd is fairly firm and contains about 0·16 per cent. of acid.

Removal of Curd to Drainer.—The curd is now removed by means of a curd-bucket on to the drainer, which contains wooden racks and has previously been lined with a cloth. The plug is left in the drainer so that the curd remains partly immersed in whey. Cover the curd with a cloth and leave until the acidity is 0·18 per cent.; then let the whey flow off, and cut the curd into squares, and turn. Leave for about twenty minutes; then cut again, this time into 2 in. to 3 in. cubes, and again turn. Do this until the curd is fairly dry and shows about 0·35 per cent. acidity, when it is ready for breaking up and vatting.

Salting.—The curd at this stage should yield about 18 lb. to every 12 gallons of milk. When small quantities are made the curd is broken with the hands into pieces the size of walnuts, much in the same way as Stilton curd, but when made in factories in any quantity a Cheddar mill is used. Salt at the rate of 1½ lb. of salt per 100 lb. of curd.

Vatting.—At this stage the temperature of the curd should be 60° to 65° F., and the acidity should not exceed 0·4 per cent., as, if too much acid be developed before vatting, the result will be a firm, close-textured cheese, and the mould will not develop. The curd is put into the moulds and left for two to four hours, after which the cheese is turned into a dry cloth and placed in the press, the weight applied being only 2½ cwt. The next morning the

cheese is taken out, turned, and put back for a few hours before finally removing from the press. Some makers prefer to leave the cheese in the press until the following morning with 4 cwt. pressure, but this is not the general practice.

Bandaging.—When the cheese is taken out of the mould a bandage is sewn round it, and, as at this stage the cheese is fairly soft, marks or ridges form. This is a peculiarity of Wensleydale cheese; therefore, where this class of cheese is manufactured on a large scale in factories and too much time and labour would be required to stitch the bandages on, they are pasted round the sides as in the case of Cheshire, and string tied round the cheese to make the marks form on the sides.

At this stage the cheese are placed in a cool, moist, well-ventilated room for about seven days; then removed to the curing-room, the temperature of which should be 60° F., and turned every day. Care should be taken to brush the mites off the shelves and the cheese, as in the case of Stilton, and the ripening-room should be kept dark. When six weeks old the bandages may be removed, and if the mould be not developing the cheese should be skewered.

A good Wensleydale cheese should be ripe and ready for sale in five to six months, and veined with blue mould throughout.

Acidity at different Stages.—Milk at renneting, 0·2 per cent.; when cut, 0·13 per cent.; removal to drainer, 0·16 per cent.; final removal of whey, 0·18 per cent.; vatting, 0·35 per cent.

Flat Wensleydales.

The manufacture of flat Wensleydales is very much the same as that given above, only the moulds are of a different shape and size. As no blue mould is developed, the cheese may be placed in the press as soon as the curd is filled into the moulds, and the bandages may be pasted on. This class of cheese is sold when about two months old, chiefly amongst the mining population in Yorkshire.

Miniature Wensleydales.

The chief difference between these and the full-sized cheese is the amount of acidity which is developed. The method of manufacture is practically the same, with the exception that the curd is vatted when showing 0·2 to 0·25 per cent. of acid. The cheese are placed under pressure as soon as the moulds are filled, and the next morning after bandages have been pasted round them they are replaced in the moulds and again subjected to slight pressure. The following morning they are taken out and placed in a draught to dry. They are ripe and ready for sale in about three weeks' time.

MAIZE-GROWING IN CANTERBURY.

A. MACPHERSON.

A MAIZE variety test was conducted last season by Mr. O. I. Houson, of Harewood Road, Papanui, and the results were distinctly encouraging. The soil in the experimental area was as nearly uniform as possible in character, and was a black loam on a clay subsoil on which a crop of oats had been grown the previous year. In September, 1912, the land was ploughed, and was afterwards cultivated four times and tine-harrowed. On the 20th November the varieties of maize were drilled in, the seeding being at the rate of 96 lb. per acre. The plots were fertilized with superphosphate at the rate of 1 cwt. per acre. The varieties were cut at time of tasselling, and were fed to the dairy herd on the pastures.

An area of each plot was cut and weighed on the 12th March, 1913, with the following results:—

Plot.	Variety.	Yield in Tons per Acre.
1.	Gibbons and Co.—Hickory King White ..	.. 22·16
2.	,, Rural Thoroughbred ..	.. 19·83
3.	,, Summerton White ..	.. 19·83
4.	,, Craig Mitchell ..	.. 16·72
5.	Montgomery and Co.—Craig Mitchell ..	.. 14·77
6.	,, Victorian White ..	.. 19·05
7.	,, Yellow Horse-tooth	.. 33·05
8.	Gibbons and Co.—Early Red Hogan ..	.. 24·11

Properly planned and executed rotations and tillage methods will greatly reduce the loss by droughts of only moderate severity.—*Year-book of the United States Department of Agriculture.*

It is now recognized that instruction, investigation, research, and organization are public services which cannot be left to the initiative of individuals or private bodies, more especially as those to whom we must look for increased production are mainly smaller farmers.—*Bulletin of the International Institute of Agriculture.*

Maize Crop on the Farm of Mr. O. I. Houson, Papanui.

NATIVE PLANTS.

W. H. TAYLOR.

IN my last article I dealt with the re-establishment by mossing of plants collected from the bush. It may happen that some reader may obtain possession of plants that have been left too long in moss, or it may occur with plants he has collected himself. When this has happened the roots reach out from one plant to another until they become entangled. The way to treat such plants is to tear them apart and begin again *de novo*. Remoss them, and let them make a fresh lot of roots before attempting to plant them out, or there will be many losses.

It may be desired to grow some plants in pots. Indeed, so far as I know, it is the best way to grow a large number of plants, partly because many of them, particularly mountain plants, will not succeed in the open ground at a low level. The first thing to arrange for is suitable soil. Good peat is a very desirable thing for this purpose, but it can seldom be obtained. There is none in New Zealand, except such as is imported from England. Good turfy loam is next best. We have neither at Weraroa and still manage fairly well. We have no soil but that resulting from heaps of decayed weeds, and it contains a proportion of ordinary soil. This is used in small quantity to give weight to the compost, the remainder of which is bush leaf-mould and sea-sand, with a moderate quantity of sphagnum moss cut up as fine as possible and well mixed with the compost. The sphagnum ensures permanent freeness of the compost, and does not sour. The pots used should be quite clean both inside and out, and dry at the time of using—a trifling matter at first sight, but really of great importance. Clean pots are porous and air penetrates them. This is desirable. If the inside of a pot be dirty with soil from former use, the roots of the plant will take hold of it and two evils will result. One is that you cannot knock the plants from the pot without injuring roots. Sometimes it would even result in breaking up the whole ball in the attempt. The other evil is that it is likely to cause the whole of the soil to sour by preventing perfect drainage. Pots should be drained properly. The placing of a few crocks in the bottom of the pot will not provide drainage. The crocks should be covered with a thin layer of moss to keep the soil from them.

1. 2. 3. 4. 5.

1. *Olearia nummularifolia*. 2. *Olearia insignis*. 3. *Olearia angustifolia*—Tiki-a-weka. 4. *Olearia avicenniæfolia*—Akeake.
5. *Olearia Colensoi*—Tupari.

The time for potting is of great importance. Potting should never be done at a time when plants are dormant. Unless growth quickly follow the potting the soil is bound to sour, and failure will follow. Soon after a plant begins to put on new growth is the time to pot, and with most subjects this occurs in early spring. Plants already in pots should not be moved during winter, and plants received at that time, or late autumn, should be mossed up until spring, or dealt with in a manner to be explained later.

For more complete understanding, the native plants may be divided into sections: (1) Those that are easily raised from cuttings, (2) those that can be raised only by seed, and (3) such herbaceous plants as are easily increased by division.

The first section includes veronicas, olearias, some senecios, and others. Such plants are easily grown even by the roughest of methods. In fact, with a few exceptions, they live with scarcely any care, and may be transplanted at almost any time. Cuttings root best in autumn or early spring. Cuttings 2 in. or 3 in. long will do, or they may be longer. Most root freely in the open ground, or, if preferred, in shallow boxes in a cold frame. Such varieties of *Veronica* as *chathamica* and *decumbens*, whose branches lie on the ground, may be increased easily by throwing a spadeful or two of sand into the middle of them. Every branch will root in a few weeks, and may then be cut off. Others, such as *Buchanani*, *Bidwillii*, *Lyallii*, *epacridia*, *tetragona*, and all of similar habit are readily increased by division or cuttings. That very distinct variety, *salicornioides*, I have found to root best when protected from rain. Cuttings should be placed round the edge of a large pot or pan and kept in a cold frame. The *Veronica* family is well worth special attention, ranging as it does from pigmies to small trees. Most of them are handsome plants, and they are all interesting. The shrubby senecios are mostly valuable garden plants, easily raised by cuttings and easily grown. In the mode of increase, however, there is some difference. *Senecio Huntii*, a variety from the Chatham Islands, I have been unable to raise by cuttings. Several people have told me they have succeeded with cuttings. I shall be glad to receive any hints readers may be able to give me on the subject, as it is perhaps the most handsome member of the family. Herbaceous senecios are suitable for pots or rockery, and should always be in moist and cool situations.

Preparing Plants for Potting.

In my previous article I advised that the moss be not removed from plants put out in the open ground. There should be some difference made when placing them in pots. It should be under-

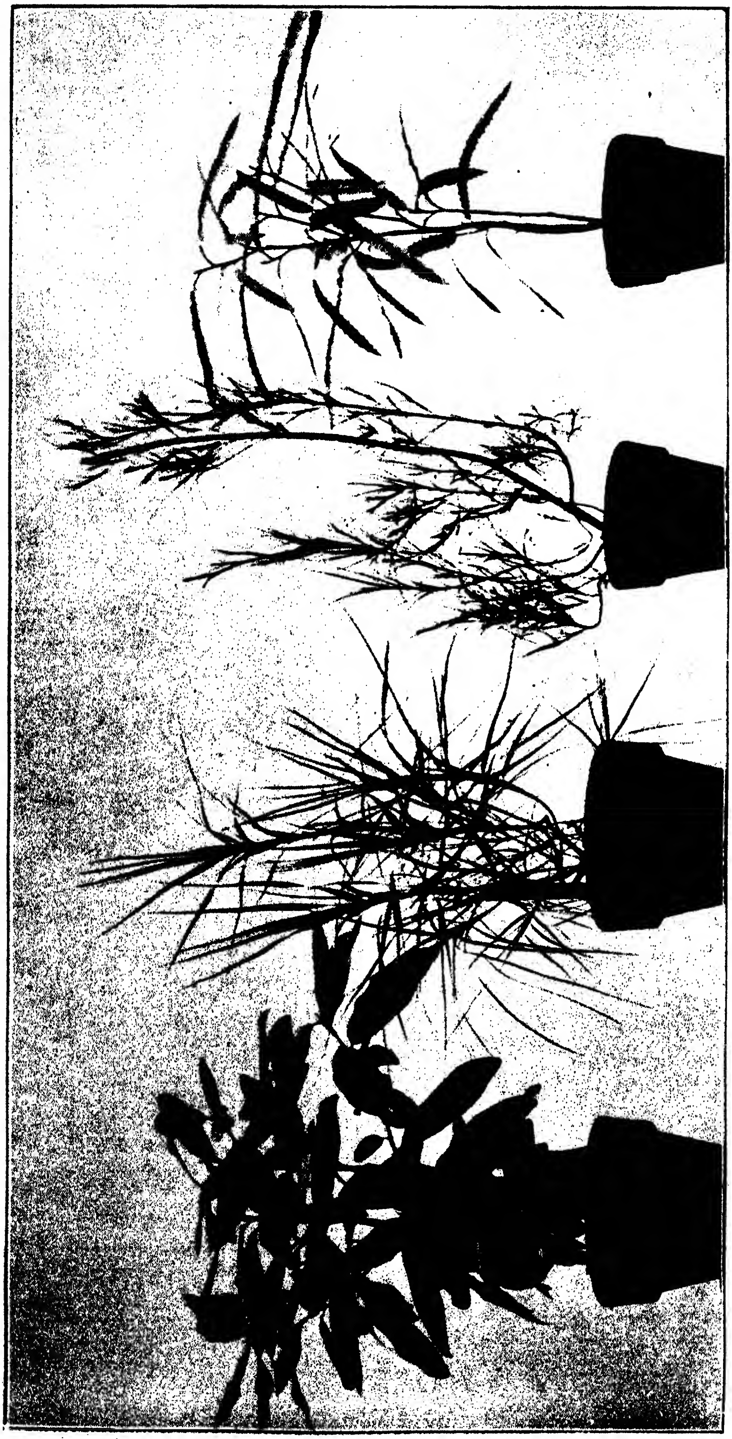
6. 7. 8. 9. 10.

6. *Podocarpus ferruginea*—Miro, black-pine. 7. *Podocarpus spicata*—Matai. 8. *Dacrydium laxifolium*—Dwarf rimu.
9. *Dacrydium cupressinum*—Rimu, red-pine. 10. *Dacrydium Colensoi*—Silver-pine.

stood that there is a wide divergence in the adaptability of these plants to cultivation. Some are extremely easy to grow, some impossible, with gradations between. For instance, *Euphrasia cuneata*, an extremely beautiful plant when in flower, apparently refuses to grow out of its natural habitat. About Paraparaumu it is abundant in the sphagnum swamps, growing solely in sphagnum. I know of no successful attempt at cultivation. Craspedias, geums, enargeas, all small plants, appear decidedly miffy. While many others are easily grown, these require care. For potting I always remove the loose moss (and that only) if the pot be 5 in. or more in diameter. If the pot be smaller, take away all the moss possible without destroying roots. The reason for this is that when a ball of moss is placed in a small pot a proper condition of moisture cannot be maintained; it will be too spongy—too wet or too dry. If a shade-house be provided for the purpose of establishing plants collected, or for the after-cultivation of some of them, beds of some kind must be provided. When they are in out-of-the-way places and are to be used simply for accommodating boxes and pots, the beds may be of gravel. The site should be drained well in any case. A more useful bed will be formed if 12 in. of rough gravel be covered with a layer of spent tanner's bark 8 in. or 10 in. deep. This material is used extensively in England as plunging material in forcing-houses. Pots plunged in the bark are kept cool during summer, and the demand for water is consequently reduced. This alone is a great advantage when plants have to remain a long time in one pot. The pots should be stood on the surface during winter to allow air to circulate about them; otherwise the soil would get too wet. After the tan has been in use for a season or two it breaks up and becomes finer, and in this condition it is excellent for establishing plants. The plants when brought from the bush may be heeled close together in the tan. They speedily form roots and lift with a ball of tan attached. It is, in fact, the best rooting material I know of. Cuttings root readily in it, and any plant will grow in it. Native plants of trailing habit, such as *Nertera depressa*, *Pratia angulata*, *Mazus pumili*, *Gunnera monoica*, hydrocotyles, as well as pigmy veronicas, luxuriate under this treatment. An ornamental rockery of considerable beauty might be formed under the shade-house by building pieces of rock on a pile of tan.

Raising Plants from Seed.

There is no difficulty attending this work, provided the seeds be fresh and properly matured. A large number of the bush plants, however, bring very few seeds to maturity. Thus many might be sown that are mere husks, and, of course, no results would follow. Given proper seed and freshly gathered, they are generally raised



11. 12. 13. 14.

11. *Drimys colorata*—Red-pepper tree, horopito. 12. *Dracophyllum Kirkii*—Kirk's grass-tree. 13. *Dracophyllum Urvilleanum.*
14. *Knightia excelsa*—Rewarewa, honeysuckle.

easily under cool conditions. The easiest way is in the tan bed, if room can be found. No watering is required, the tan being at all times sufficiently moist. However, there are exceptions to this. Celmisias, for instance, will germinate freely in the tan, but they damp off afterwards. A box is the best thing to raise them in. Stand the box in the shade-house and cover with a sheet of glass to keep rain-drips out. The soil should be light and sandy. Most shrub-seeds germinate well in boxes of free soil in a cool frame. Give a little shade till the seedlings appear. Nikau-seeds come best in the tan bed, which closely approximates the conditions under which they grow naturally. Clematis-seed comes up in a few

15. 16. 17.

15. *Senecio Hectori.* 16. *Senecio Monroi.* 17. *Senecio Greyii.*

weeks if sown at the time of gathering, but when held until it hardens it will take some months. I have known maire-seed to take fifteen months to germinate. When seeds of anything like a hard nature that are not freshly gathered are sown in boxes the best plan is to cover them up and keep them dark. If there be a number of boxes, stand them in a pile, one over another in a shady cool place, thus obviating the necessity for watering. Examine them now and again and remove to light any that may have young plants showing. Many seeds may be sown in the open ground in nursery rows. Kowhai (*Sophora tetraptera*) seed comes well in the open ground. This seed should first be steeped in water. Pour boiling water on it, and let it stand for twenty-four hours.

WHEAT TESTS AT MOUMAHAKI.

T. W. LONSDALE.

IT is generally admitted that the land at the Moumahaki Experimental Farm is not eminently suitable for wheat-growing; nevertheless payable crops have been obtained on the lighter soils characteristic of the higher portion of the farm. During the past season several varieties of wheat were tested, the work being under the direct supervision of Mr. W. S. Hill, plant-breeder at this farm, who reports as follows:—

Burgoyne's Fife Wheat.—This wheat brairded and tillered well. It had much flag, and no rust was observed. The crop could not be termed an even one, as many stalks were longer and shorter than the average, although the straw was of medium strength. Though slightly affected by birds, the yield was 35·2 bushels per acre of a good saleable grain.

Langmoor Solid-straw Tuscan.—This variety has again amply demonstrated its good qualities in this locality. The area sown was slightly under two-fifths of an acre. The yield was at the rate of 40·37 bushels per acre, the grain being of excellent quality. The crop withstood the winds well and was even throughout. The birds showed no desire to take grain from the standing crop, while other varieties grown in the proximity were damaged by birds. The straw has been chaffed. It yielded a good sample of wheat-straw chaff, which averaged 7½ cwt. per acre. This is perhaps the most desirable wheat to grow in this district.

Rieti Wheat.—The same area as that of the previous plot was sown. This yielded at the rate of 34·06 bushels per acre. This is an awned variety, with rather weak straw, but with large well-filled grain. It was slightly damaged by birds. It gave a yield of 6½ cwt. of chaff to the acre. It is doubtful whether this variety is worthy of further trial.

McCallum's Solid Straw.—This variety appears to be a selection from Velvet wheat. The small plot grown this season promised well, and warrants a more extensive trial.

Turkey Winter.—Growth, ears, and grain were very small. It does not show sufficient promise to warrant further cultivation on this farm.

Hedgerow.—This variety was grown at Moumahaki in 1898-99-1900, and was reported to be of little commercial value in this country. It was very slightly attacked by rust this year. It has a fine straw, and nice sample of grain, though small. This season's trial does not warrant a further test.

Cedar.—This has a medium-sized ear and hard grain, with a clean but weak straw. It was not affected by rust, but the straw is too weak for this locality.

Marshall's White Chaff has been grown on a somewhat larger area during the past two seasons and suits this locality, being of strong growth.

Of the varieties tested, the following are recommended for further trial in this locality: *Langmoor Solid-straw Tuscan, McCallum's Solid Straw,* and *Burgoyne's Fife.*

BARLEY IN ALBERTA.

B. C. ASTON, F.I.C.

THE chemist to the Canadian Dominion Experimental Farms (Mr. F. T. Shutt, F.I.C.) in his annual report for 1912 has an interesting series of analyses showing the remarkable effect of growing barley on Alberta soils. The parent seeds are described as "Chevalier," "New Zealand," and "Hannchen," the two former from Montana and the latter from Ontario. Owing to the season being an unusually rainy one, and therefore one in which irrigation might not be expected to yield results, there is little difference between the irrigated plots, but the analysis of the barley compared with that of the parent seed, especially in the seed from Montana (U.S.A.), "New Zealand" and "Chevalier," shows the effect of differences of soil and climate on the composition of the plant. The investigation has brought out very plainly that there has been a very considerable increase in the protein-content of the barley by its growth in Alberta.

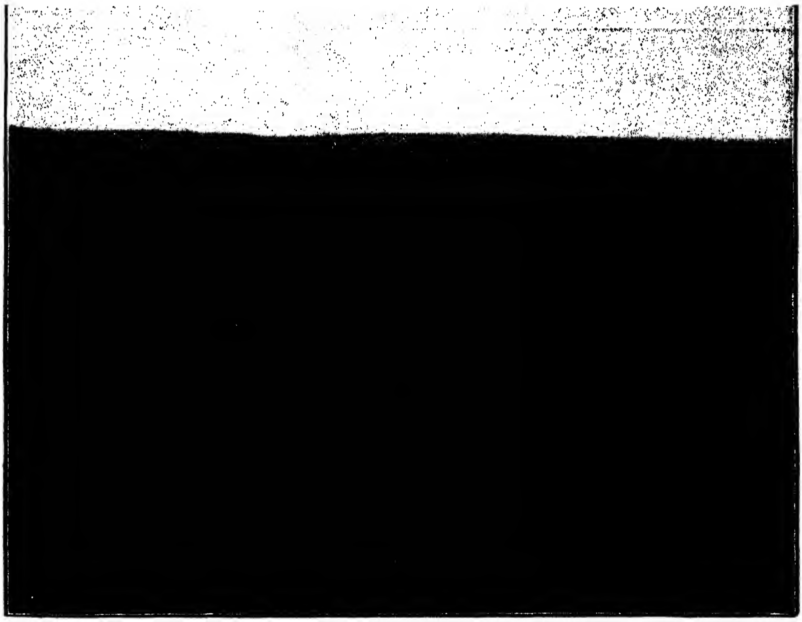
—	Moisture.	Protein.	Fat or Oil.	Carbo-hydrates.	Fibre.	Ash.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
"Chevalier," parent ..	10·21	10·75	1·87	72·78	2·36	2·03
,, non-irrigated ..	7·62	11·28	2·50	70·65	5·25	2·70
"New Zealand," parent ..	9·32	10·75	1·68	72·74	2·85	2·66
,, non-irrigated	8·52	13·60	2·21	67·38	5·51	2·78
"Hannchen," parent ..	9·46	9·63	2·60	71·52	4·09	2·70
,, non-irrigated ..	7·16	13·64	2·14	70·64	3·85	2·57
Average of twenty samples of Ontario-grown barley	11·96	10·57	2·06	68·90	4·10	2·41

Lucerne is a fodder which should find a place wherever it will grow. Many lucerne failures may be due to seed.

PUMICE SOILS AND THEIR TREATMENT.

B. C. ASTON, F.I.C.

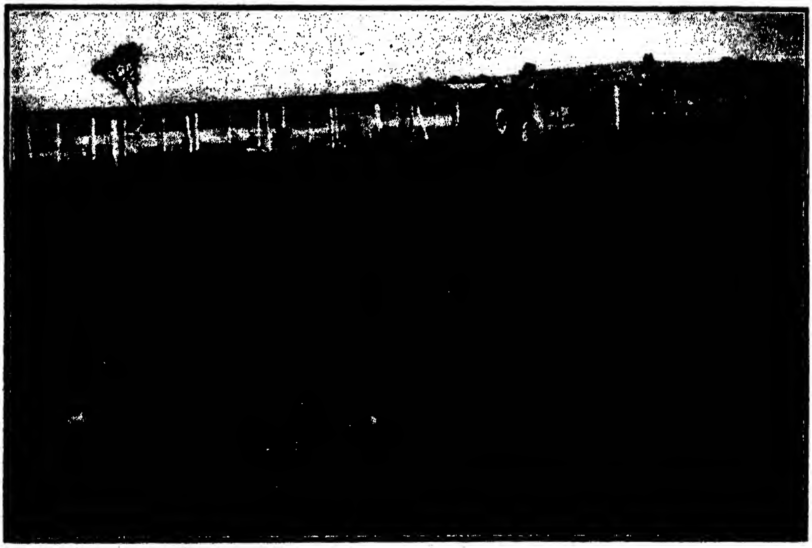
MR. W. G. STEAD, with commendable enterprise and without any departmental assistance, has been experimenting with various grasses on the pumice soils of the Kaingaroa Plains, on the portion which adjoins his Reporoa Station, near Waiotapu. I recently had an opportunity of visiting Reporoa, and through the courtesy



B. C. Aston, photo.]
TYPE OF COUNTRY GROWING SILVER-TUSSOCK REPRESENTED BY SAMPLE C1317/6.

of Mr. R. Turpin, the manager, spent some days examining the country and the experiments. Much of the land near the homestead consists of niggerhead (*Carex*) and flax (*Phormium*) swamp, which is gradually being drained and brought in. (See analysis C1317/5.) Other land on the rise appears to have been swamp at one time and to have been subsequently elevated and so self-drained. It therefore contains a larger amount of organic matter and available mineral plant-food than do ordinary soils of the district, and would, on the analysis, be classed as exceptionally

rich soil. The analysis is also borne out by the farming results. It is found that cruciferous crops (rape, turnips, &c.) grow luxuriantly with very little fertilizer—1½ cwt. of proprietary manure, containing nitrogen (insoluble), 1 per cent.; phosphoric acid, P_2O_5 (soluble), 4 per cent.; phosphoric acid, P_2O_5 (insoluble), 9·5 per cent.; potash, K_2O, 0·5 per cent. A photo shows a crop of rape which would do credit to the richer Canterbury soils. A field of lucerne is also shown, which is evidently well established. It was sown with 2 cwt. of proprietary manure in November, 1912, the soil being inoculated. Photo taken in March, 1913. Sample No. 1317/9 shows the analysis of a sample of this low-lying country.



B. C. Aston, photo.] LUCERNE AT REPOROA.

In addition to this type there are the Kaingaroa Plains soils, on a plateau about 400 ft. above the homestead. These are producing a shrubby growth of tutu (*Coriaria ruscifolia*), manuka (*Leptospermum scoparium*), gaultherias, Strathmore weed (*Pimelia*), and bracken fern (*Pteris esculenta*), with a number of other small native plants. The analysis of this type of soil (see No. 1317/7) shows it to be much richer in available phosphoric acid than the Government experimental plots or prison camp at Waiotapu, given under C1064/7 and 1064/8, which is from the same type of country. The sample C1317/7 was taken from virgin unmanured land, close to where Mr. Stead's experiments were put down.

Concerning the intermediate land between the swamp and the plateau this may be noted: The sample C1317/6 was taken from

a low hill, 40 ft. to 50 ft. above the swamp, covered with large pumice boulders and growing silver-tussock (*Poa cæspitosa*), *Pimelia*, manuka, Cape weed, and clovers (white and yellow). Sample C1317/8 was from a pure shrubbery of monoao heath (*Dracophyllum subulatum*), popularly supposed to indicate poor land, a supposition which in this case is certainly not borne out chemically. Sample 1316/10 was collected at Pakaraka, near Earthquake Flat, on grass land (*Agrostis*), and is, though well supplied, much lower than the Reporoa soils in available plant-foods. All of this country has, of course, been subject to falls of ejected material from Tarawera and other volcanoes, but why some portions of the material should be so rich

B. C. Aston, photo.] THE RAPE CROP AT REPOROA.
Kaingaroa Plains in the Background.

and others so poor in available plant-food is a matter for further research.

Mr. Stead's report to me is dated 31st May, 1913, and is as follows :—

The piece of ground is right on top of the plains and is not in the least favourably situated. I picked out a place that is similar to the whole of our plains area (some 12,000 to 14,000 acres). The ground was ploughed, harrowed, and sown all in the one day—date, October, 1911. This sowing, however, refers only to experiments 1 to 12 inclusive, and also plot 17B. The balance of the paddock was left ploughed until October, 1912, when I sowed grasses, &c., on plots 13 to 36 (exclusive of plot 17B). For the 1911 sowings manure was used on half of each plot at the rate of 2 cwt. per acre. The ground of the 1912 sowings has no manure whatever.

The manured parts of the 1911 sowing certainly showed to advantage the first year, but now there is little or no difference except with the cocksfoot. The other grasses that have grown are so hardy that they will always be a success on this class of country even without manure.

I would like to point out that I do not consider the ground had even fair agricultural treatment, and had I ploughed in winter and sown a crop of swedes in spring the grassing results following would, I am sure, have been far better. Had I been sowing down a paddock in the ordinary course of farm-work the ground would have received proper agricultural treatment. What I wish to convey is that I experimented for my own information, knowing that whatever grew under these conditions would grow much better under ordinary farming methods. I am quite convinced that in a year's time a selection can be made from these experiments that will enable us to grass the whole of our plains country.

GRASSES, ETC., IN EXPERIMENTAL PLOTS.

Plot No.	Name.	Remarks (27th May, 1913).
	1. Sown in October, 1911.	
1	Red-top	Good growth; great quantity seeded; forming sward.
2	*Danthonia pilosa*	Splendid growth; has thickened into sward to cover the ground; could not be better.
3	Paspalum	Fair strike; killed by frost last winter.
4	Chewing's fescue	Good germination; healthy plants; no great bulk of feed.
5	*Poa pratensis*	Failure.
6	Sheep's fescue	Good germination; good sward; more bulk of feed than Chewing's fescue.
7	*Phalaris bulbosa*	First strike good, but dying out.
8	Fiorin	Good strike; badly affected by frost; not necessarily dying out.
9	*Danthonia semi-annularis* ..	Not such good strike as *pilosa*, but very healthy plants and doing well.
10	Swedes	Not a success, but unfair test.
11	Rib-grass	Good strike, but no bulk of feed.
12	Cocksfoot	Good strike. Would probably be affected by frost if grazed heavily by sheep.
	2. Sown in October, 1912.	
13	B mixture: 10 lb. Farmer's dressed cocksfoot, 4 lb. M.D. N.Z. cow-grass, 2 lb. M.D. crested dogstail, 2 lb. Chewing's fescue, ½ lb. *Lotus angustissimus*, ½ lb. *Lotus corniculatus*, 1 lb. white clover, 20 lb. perennial rye-grass, 3 lb. danthonia, ⅛ lb. (approx.) brown-top	Most grasses have struck; too early to make report; rye-grass apparently not going to last. (Quantities given sufficient to sow one acre.)
14	Sheep's parsley	Good strike; standing frost well; do not know anything about feeding-value.
15	Tall oat-grass	Medium strike; apparently affected by frost.
16	*Lotus corniculatus*	Apparently a failure; so far plants very weak.
17	Chicory	Few strong plants, but majority poor; leaves affected by frost.
17B	Sheep's burnet	(This plot was sown in October, 1911.) Fair strike; there are a lot of young plants that have sprung up from this year's seeding; does not, however, look permanent.
18	Kidney-vetch	Fair germination; no growth.

GRASSES, ETC., IN EXPEERIMENTAL PLOTS—*continued.*

Plot No.	Name.	Remarks (27th May, 1913).
	2. *Sown in October, 1912*—continued.	
19	Ratstail	Very poor germination, but few plants very vigorous; has thrown long seed-heads first season; good growth.
20	Sweet vernal	Good strike; good growth; apparently going to be a success.
21	Melilot	Fair strike; plants good; likely to be success.
22A	Johnson grass	Fair strike, but no bulk of feed.
22B	Rhodes grass	Good strike; good growth; tops browned right off by frost; plants may not be dead; suckers 24 in. long first year, and taking hold of ground in three or four places.
23	Yorkshire fog	Splendid strike; good growth; standing frost better than any other grass.
24	True golden oat-grass ..	Moderate strike; exceptionally good plants, standing frost well.
25	Sanfoin	Came well, but birds pulled badly; moderate growth; plants that have grown fair bulk.
26A	Wild white clover ..	Good strike, but only short growth; plants, however, covering ground.
26B	Egyptian clover	No sign of this, but good sward of sorrel; there is no sorrel anywhere else in the experimental plots.
27A	Swedish-grown cow-grass ..	Poor.
27B	Russian-grown cow-grass ..	Poor.
28A	Strawberry-clover ..	Poor; cut down by frost.
28B	English-grown late-flowering red clover	Good strike; good growth; likely to be a success.
29A	Swedish-grown alsike ..	Fair strike; cut right down by frost.
29B	Bokhara clover	Poor strike; practically a failure.
30A	*Lotus angustissimus* ..	Good germination, but very poor growth; plants small.
30B	*Lotus major*	Good strike, but only moderate growth.
31A	*Lotus villosus*	Moderate strike, but very little growth.
31B	Red fescue	Fair strike; plants show good growth; more bulk than either Chewing's or sheep's fescue.
32A	*Festuca heterophylla* ..	Very poor germination, but what plants have grown apparently a success; standing frost.
32B	German hard fescue ..	Good strike; moderate growth; cut back slightly by frost.
33A	Brown-top	Germination only fair; plants healthy; some good growth; all standing frost well; likely to be success.
33B	*Eragrostis Brownii* ..	Only a few plants have grown; not sufficiently forward to express an opinion.
34A	Colonial white clover ..	Good strike; some plants very healthy and already seeded; success.
34B	Colonial-grown cow-grass ..	Part of plot failure, part excellent; apparently due to variation of soil.
35A	Subterranean clover ..	Splendid strike; good growth; likely to be success; very promising.
35B	(Incomplete record.)	
36	Polygonum	Fair strike; moderate growth; affected by frost.

WAIOTAPU AND KAINGAROA PLAINS SOILS.

Labratory No.	Moisture.	Organic Matter and Combined Water.	Total Iron.	Phosphoric Acid (Total).	Available Plant-food (Dyer).		
					Lime (CaO).	Potash (K_2O).	Phosphoric Acid (P_2O_5).
C1317/5	71·38	48·81	3·00	0·331	0·252	0·029	0·070
6	26·77	9·27	0·88	0·118	0·111	0·027	0·032
7	37·62	10·93	0·87	0·097	0·087	0·027	0·045
8	39·35	9·66	1·24	0·061	0·144	0·024	0·041
9	46·34	21·04	18·15	0·150	0·243	0·043	0·120
10	32·73	10·96	0·82	0·091	0·227	0·022	0·026
1064/7	22·26	..	0·49	0·051	0·034	0·013	0·013
8	23·10	..	0·49	0·069	0·033	0·018	0·018

The figures for plant-food show percentages on soil dried at 100° C. Most of these samples were taken to a depth of 9 in. with a boring-iron. Each sample represents four subsamples.

LUCERNE - SEED - GROWING IN NEW ZEALAND.

POVERTY BAY EXPERIENCE.

A. H. COCKAYNE.

THE bulk of the lucerne-seed used in New Zealand is imported. It has been amply demonstrated that the best results have invariably been secured when locally grown and acclimatized seed has been used, though excellent results have been attained from seed acclimatized in Australia. A great deal of the seed sold in New Zealand is of Asiatic origin, and the experience with this has not been at all satisfactory. Seed from that quarter is not held in high repute in other countries into which it has been imported, pointing to the fact that it is necessary to produce lucerne-seed in the country where it is to be used. So far in the Dominion the only local seed used to any extent is that harvested in the Marlborough District. Evidence has just reached me that the production of lucerne-seed is now claiming attention in other districts of the Dominion. Messrs. Williams Bros. have demonstrated in the Poverty Bay district that lucerne-seed cannot only be produced successfully in that province, but at such a rate that it may prove a highly profitable undertaking. Off 6½ acres of ground they have secured over 2 tons of cleaned seed, or, roughly, 690 lb. per acre. At the market price of lucerne-seed—£90 per ton—this works out at a gross return of £27 per acre. The original seed came from the Argentine, and an examination of the plants shows the form to approximate closely to that known

as Hunter River, the foliage being exceptionally broad-leaved. The lucerne was cut in October and then shut up for seed, being harvested during the middle of March. From this it will be seen that the production of seed was not the only source of revenue from the crop. This return of £27 per acre is, of course, an exceptionally high one, but it indicates clearly the great possibilities in front of lucerne-seed-growing in those districts where the climate is a suitable one.

A very important factor in successful lucerne-growing is to use seed which is free from dodder, and this can be by no means guaranteed when foreign seed is used. So far the lucerne-fields in New Zealand are free from this dangerous parasite, but it is feared that with the use of low-grade Asiatic seed (often, unfortunately, sold as European) the danger of the establishment of this pest is very great. All lucerne-seed growers should examine their fields carefully from time to time for the presence of dodder. The best means of keeping out the pest, however, is the production of our own seed, and for this reason alone the experiment quoted above is to be heartily welcomed. An important fact in lucerne-seed-growing in this country is that there is no danger of overproduction, while under proper management the quality of the local seed can be of such a high grade that it would always command a remunerative price on the great lucerne markets of the world.

SILVER-BEET SEED.

UP to the present time the Department has been in the same position as the private grower in regard to the difficulty of securing seed of the desired varieties of silver-beet for stock-feeding purposes. This year the work of selecting seed has been instituted at the experimental farms, and it is hoped that next autumn small samples of seed of the approved varieties will be available for distribution. It is expected that several of the leading seed firms in the Dominion will have seed of the varieties recommended by the Department on the market next year. One of the leading European seed firms, Messrs. Villmorin and Co., of Paris, as a result of a personal investigation by the firm's principal member of the demonstration in New Zealand in regard to silver-beet as a forage crop for stock, has decided to cultivate for seed the types of silver-beet recognized by the Department as the most valuable for stock-feeding. No doubt the French seed will be on the New Zealand market in due course. The seed of the varieties used in southern co-operative field experimental work was obtained from Messrs. Montgomery and Co., seed-merchants, Christchurch.

QUALIFIED VETERINARY SURGEONS.

NEW ZEALAND LIST.

For the guidance of stockowners and for general information it is intended to publish in the *Journal*, at six-monthly intervals, a list of qualified veterinary surgeons known to be residing in New Zealand. Following is the second list.

In the event of the name of any properly qualified veterinarian being omitted, it is requested that he communicate with the Editor, giving particulars of his qualification, in order that the necessary steps may be taken for the inclusion of his name in the next published list.

Ashe, G. G., M.R.C.V.S., Timaru.
* Barnes, A. W., M.R.C.V.S., Hastings.
Begg, W. P., M.R.C.V.S., Ashburton.
* Blair, W. D., M.R.C.V.S., Dunedin.
* Blake, T. A., M.R.C.V.S., Wellington.
Brodie, A. M., M.R.C.V.S., Hastings.
* Broom, G., M.R.C.V.S., Waitara.
* Burton, S., M.R.C.V.S., Gisborne.
Charlton, J. R., M.R.C.V.S., Christchurch.
* Clayton, J. G., M.R.C.V.S., Wellington.
Cockroft, J. E., M.R.C.V.S., Palmerston North.
* Collins, W. T., M.R.C.V.S., Hamilton.
Crossley, F., M.R.C.V.S., Wellington.
* Cunningham, T., M.R.C.V.S., Oamaru.
Danskin, J., M.R.C.V.S., Balclutha.
Edgar, P. M., M.R.C.V.S., Wanganui.
* Elphick, E. E., M.R.C.V.S., D.V.H., Christchurch.
* Finch, R., M.R.C.V.S., D.V.S.M., Auckland.
Glover, F., M.R.C.V.S., Hamilton.
Hamilton, A., M.R.C.V.S., Musselburgh, Dunedin.
* Hickman, A. J., M.R.C.V.S., Auckland.
* Howard, E. C., M.R.C.V.S., Wellington.
Johnson, A. A., F.R.C.V.S., Christchurch.
* Kerrigan, J., M.R.C.V.S., Christchurch.
Lilico, T. G., M.R.C.V.S., Christchurch.
* Lyons, J., M.R.C.V.S., Auckland.
Machattie, D. H., M.R.C.V.S., Leeston, Canterbury.
Marquis, N., M.R.C.V.S., Waimate, South Canterbury.
Martin, H. E., M.R.C.V.S., Gore.
McLeod, J., M.R.C.V.S., Christchurch.
Meade, R. H., M.R.C.V.S., Palmerston North.
Miller, W. J., M.R.C.V.S., Invercargill.
Neale, C. R., M.R.C.V.S., Hawera.
Palgrave, T. G., M.R.C.V.S., Auckland.
* Paterson, A. M., M.R.C.V.S., Timaru.
* Primmer, J. H., M.R.C.V.S., Palmerston North.
Quinnell, W. C., M.R.C.V.S., Wellington.
* Rait, D. H., M.R.C.V.S., Palmerston North.
Reah, A., M.R.C.V.S., Gore.
* Reakes, C. J., D.V.Sc., M.R.C.V.S., Wellington.

* Officers of the Live-stock and Meat Division, Department of Agriculture, Industries, and Commerce.

* Reid, H. A. F.R.C.V.S., D.V.H., F.R.S.E., Wellington.
Robertson, F. C., M.R.C.V.S., Ashburton.
Robertson, F., M.R.C.V.S., Oamaru.
Simpson, C. S., M.R.C.V.S., Parnell, Auckland.
* Snowball, W. D., M.R.C.V.S., Dunedin.
* Spilman, D., M.R.C.V.S., Wellington.
* Stafford, J., M.R.C.V.S., Christchurch.
† Stapley, W., M.D., D.V.Sc., M.R.C.V.S., Cambridge.
Taylor, A., M.A., M.R.C.V.S., Lincoln, Canterbury.
Taylor, J. B., M.R.C.V.S., Waverley.
* Taylor, W. G., M.R.C.V.S., Wellington.
Ward, J., M.R.C.V.S., Katikati, Bay of Plenty.
* Waugh, G. N., M.R.C.V.S., Invercargill.
* Wood, R. B., M.R.C.V.S., Auckland.
* Young, A. R., M.R.C.V.S., Wellington.
* Kyle, H. S. S., G.M.V.C. (Melbourne), Christchurch.
* Marsack, H. L., V.S. (Ontario), Auckland.
Ring, W. C., V.M.D. (Penn., U.S.A.), Ellerslie.

* Officers of the Live-stock and Meat Division, Department of Agriculture, Industries, and Commerce.
† Not now practising as a veterinary surgeon.

CANTERBURY SCRUB LANDS.

B. C. ASTON, F.I.C.

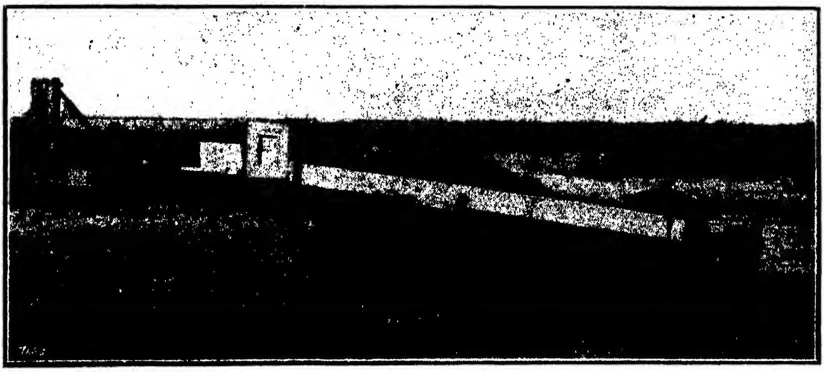
THERE is a large area of flat country which is, on the surface at least, of a gravelly nature, and supports a growth of scrubby manuka (*Leptospermum*). It is situated within thirty miles of Christchurch, and is approached by excellent roads. Investigation

B. C. Aston, photo.] TYPICAL VIEW IN CANTERBURY SCRUB LAND.

is now being made as to the possibility of utilizing this land to a greater extent than has hitherto been attempted. It is hoped to ascertain whether the soil and subsoil vary in mechanical and chemical composition, and the methods best calculated to bring the present waste areas into profitable occupation, to which end the

matter is at present receiving the attention of the Fields Instructor in the South Island (Mr. A. Macpherson). Chemical analysis of one sample of fine soil taken from the surface of gravel at West Eyreton shows that it is a brown, fairly friable, coarse, sandy loam, faintly acid in reaction, the soil, dried at 100° C., having the following composition :—

	Per Cent.
Organic matter and combined water	8·710
Total nitrogen	0·290
Available potash (K_2O)	0·028
Available phosphoric acid (P_2O_5)	0·011
Hydrochloric acid extract—	
Lime (CaO)	0·280
Magnesia (MgO)	0·490
Potash (K_2O)	0·210
Phosphoric acid (P_2O_5)	0·130



B. C. Aston, photo.]
SCRUB-ROLLER DESIGNED BY MR. MARMADUKE DIXON.

These figures seem to show that the fine soil between the stones is of fair average composition, and, with the application of phosphates and of some form of lime, may be expected to grow good pasture provided the other factors be favourable.

The illustrations show the original methods adopted by Mr. Marmaduke Dixon in dealing with these lands. The 30-ton roller first crushes down the manuka, which is bruised by the flanges bolted on the faces of the rollers, and thus prevented from springing up again. The fire is then put through, and grass-seed is sown.

A sound knowledge of breed, feed, seed, and weed must be acquired as well as that of the soil and its productivity.—*Journal of the Royal Agricultural Society of England.*

WERAROA MILK-RECORD HOLSTEIN BULLS.

THE 1912–13 draft of milk-record bulls from the Holstein herd of the Weraroa Experimental Farm will be offered at public auction on the farm this year. This will afford intending purchasers the advantage of inspecting the sires and dams of the stock they wish to purchase. There will be available twenty young sires, all bred on the property, and each lot will be offered with a complete record of the dam conducted on semi-official lines. The sires are American stock, bred from some of the heaviest milk-yielding families of the United States. The bull responsible for the majority of the calves was selected by the well-known American authority, ex-Governor Hoard, of Wisconsin. The dams of two were selected by Mr. W. M. Singleton, Assistant Director of the Dairy-produce Division, and were served in America by the sire of the world's champion junior four-year-old. The dams are mainly Longbeach stock, the most-sought-after blood in the Dominion at the present time, owing to their deep-milking qualities and that character appreciated so much by New Zealand dairymen—robustness of constitution.

A FOSTER-MOTHER.

THE accompanying photo illustrates the extraordinary instance of a mare allowing herself to be sucked by a calf. The mare referred to is the property of Mr. A. A. Mitchell, Ngamatea. It is stated that in previous years the mare had been in the habit of allowing calves to suck her, and the very complacent manner in which she submits to the operation indicates a considerable degree of self-satisfaction and acquired indifference. There is reason to believe that this phenomenon is unique. There are on record numerous cases of young animals being suckled by foster-mothers of a different species, but the combination between the mare and the calf is certainly exceptional.

The production of meat and dairy animals involves not only problems of breeding, feeding, and handling, but also those of studying, preventing, curing, and eradicating animal-diseases.—*Year-book of the United States Department of Agriculture.*

MANURE FOR SILVER-BEET.

B. C. Aston, F.I.C.

A fertilizer scheme for silver-beet has already been suggested for Canterbury lands, and to this little can be added except that coarse salt might be used as an alternative and additional plot to gypsum in plot 1.

A complete manure suitable for northern soils, except those of Hawke's Bay, may be added as follows:—

No. 7: 1 cwt. superphosphate, 2 cwt. island guano (or 1 cwt. guano and 1 cwt. basic slag), ½ cwt. dried blood, ¼ cwt. sulphate of potash, ¼ cwt. salt, per acre.

If used in Canterbury or Hawke's Bay, probably one-half the quantity will suffice.

The complete scheme now stands—

Plot 1: 1 cwt. superphosphate, 1 cwt. island guano, ¼ cwt. seed gypsum, per acre.

Plot 2: 1 cwt. superphosphate, 1 cwt. island guano, ¼ cwt. salt, per acre.

Plot 3: 1½ cwt. superphosphate, 2 cwt. island guano, per acre.

Plot 4: No manure.

Plot 5: 1 cwt. superphosphate, ½ cwt. island guano, ½ cwt. dried blood, ¼ cwt. seed gypsum, per acre.

Plot 6: 1 cwt. superphosphate, ½ cwt. island guano, ½ cwt. dried blood, ¼ cwt. sulphate of potash, per acre.

Plot 7: As above.

Westland soils should be limed at the rate of at least 1 ton of quicklime per acre before applying any fertilizer. For Otago, Southland, and Westland No. 7 of the scheme, and for Canterbury No. 6 (or a half-quantity of No. 7), will probably be found the best fertilizer for any one not wishing to carry out the full scheme.

The International Institute of Agriculture is entirely different from any national Agricultural Department. It administers no laws, distributes no grants, employs no staff of inspectors, and expends no time on "parliamentary business," but the staff is engaged almost wholly in collecting, collating, and publishing information.—*Journal of the Royal Agricultural Society of England.*

FRUITGROWING.*

HOW TO LAY OUT A COMMERCIAL ORCHARD.

W. A. BOUCHER.

SELECTION OF SITE.

IN connection with the planting of an orchard, especially if it is the intention to grow fruit for commercial purposes, the selection of a site that will prove thoroughly suitable for the trees is a most important consideration. There are few, if any, localities in New Zealand that are not subject at times to heavy winds, consequently such an aspect should be selected as will enable satisfactory shelter to be provided. Speaking generally, an easterly, north-easterly, or even northerly aspect is the most desirable, for in many localities the prevailing winds, which the orchardist has to consider, blow from the west, south-west, and south, although in some districts the heaviest winds experienced are from the north-west, south, and south-east. It is evident that if the prevailing winds are from the west, south-west, and south, land sloping gently to the east, north-east, or north can be readily provided with adequate shelter, and at the same time the orchard will derive the greatest amount of benefit from the rays of the sun. For this reason, where the land is of an undulating nature, such an aspect should be selected as being the most suitable from every point of view. In many districts a south-westerly aspect is to be avoided, as, being difficult to provide with such shelter as is necessary, the trees must inevitably suffer from cold biting winds at a season when they are most susceptible to unfavourable atmospheric influences.

SHELTER-BELTS.

The benefit that fruit-trees derive from early and permanent protection from the prevailing winds is so great that it is even desirable to plant the shelter-belts required a season or so before the orchard-trees are to be set out. Failing this, the shelter

* This article is a revised edition of a departmental leaflet as approved by the recent conference of Orchard Instructors of the Department.

planted at the same time as the orchard should receive as much care and cultivation as the fruit-trees themselves, in order to produce such rapid growth as will outstrip that of the orchard-trees and provide for them some protection during their second season. Mixed shelter-belts, from half a chain to a chain in width, such as are sometimes planted, although very attractive and effective, occupy a considerable amount of land, while the first cost for trees and labour is considerable. Many growers, therefore, will prefer to select for shelter trees of rapid growth that will prove effective, planted either in single or double rows. In some districts the Lombardy poplar closely planted in a single row is unsurpassed for the purpose. Of the pines, *muricata* is to be preferred to *insignis*, for, although of somewhat slower growth, it is more compact in habit and occupies less land for root-growth—important points to be considered, especially in the case of small or comparatively small properties.

In many localities the eucalypti adapt themselves to both soil and climatic conditions as well as, if not better than, trees native to New Zealand, proving hardy and of rapid growth. A variety that flourishes and retains its limbs well furnished with foliage from the ground upwards, while not occupying too much soil for root-action, is *E. amygdalina*. In districts where the climatic conditions are suitable some of the acacias may be selected; *decurrens* and *melanoxylon* have given excellent results. Probably no cheaper or more effective shelter-belt can be provided than the former of these. As there have been some failures in planting, probably owing to want of knowledge as to the proper method of dealing with the seed of *decurrens*, it may be as well briefly to describe how a shelter-belt of that variety should be planted. The quantity of seed required will be at the rate of ¾ lb. per acre. Overnight, from twelve to twenty-four hours before planting, pour boiling water into a vessel, and at once tip the wattle-seed into it. The steeping will cause germination to commence, and also the exudation of a certain amount of gum. The gum should be washed away, two or three changes of water probably being required to do it effectively. The seed should then be spread out to dry for, say, half an hour, care being taken that the exposure is not sufficiently long to do more than remove the moisture from the outside of the skin, and not in any way to check the germination already commenced. If there should still be any trace of stickiness left, a light sprinkling with wood-ashes will correct it. In this condition, the seed can now be drilled into the prepared land to a depth of ½ in. in two rows 6 ft. apart, with bonedust added at the rate of 1 cwt. per acre.

Soil.

As far as soil is concerned, much as the land in the Dominion varies, with the exception of the true white pipeclay of the north there is but little soil that would prove unsuitable for growing some fruit or other, aspect and climatic conditions being the main points to be taken into consideration when deciding whether or not to plant, or what classes of fruits to select.

Preparation.

Drainage must be looked upon as quite as important a factor in the successful results as aspect and shelter. In some favoured localities, the soil and subsoil being open and porous to a considerable depth, drainage is natural; but, taking the Dominion as a whole, a large proportion of the land has either surface soil or subsoil, or both, of a retentive nature. In the case of naturally drained soils a great deal of preparation is hardly necessary, although a summer fallow may be considered beneficial. But in the case of the retentive soils careful and thorough preparation is essential.

If the site selected for the orchard is level, with a tendency, after heavy rains, for the water to lie for some time on the surface, tile draining will be required, for it must be understood that fruit-trees will not thrive for any length of time if the soil in which they have been planted becomes periodically water-logged. In the case of land of an undulating character that has a natural fall, tile draining will rarely be required, for the necessary drainage can be secured by subsoiling—in fact, this method of preparation will convert what is apparently refractory and unpromising soil into land that is quite satisfactory for orchard purposes.

It is important to note that when subsoiling is being effected it is seldom desirable that the subsoil should be brought to the surface. A method of subsoiling that has found favour with many growers, being most effective and economical, is to turn over the surface soil deeply with one plough, following in the furrow with a second from which the mouldboard has been removed, and thus thoroughly breaking up the subsoil without bringing it to the surface. Following this, a summer fallow is desirable, to be followed by autumn or spring ploughing and thorough working down into a fine tilth preparatory to marking off for planting.

Purchasing Trees.

Successful orchard results depend largely upon the quality of the trees supplied to the growers; therefore orders should be placed with reliable nurserymen early in the season, to be filled later with

only well-grown thrifty young stock. Inferior, weedy young trees, even when carefully planted and tended, bring disappointment and loss to the unfortunate planter.

TIME FOR PLANTING.

The time for planting will be governed by the climatic conditions of both the season and the locality. In many districts two periods are avilable, autumn and spring. The former is to be preferred if the climatic conditions are favourable, but it must be remembered that the soil at the time of planting should be warm and dry, a condition which does not prevail in many soils when the autumn rains set in early. In such instances it is better to defer setting out until such favourable soil-conditions are to be met with in the spring, for to plant in cold, water-sodden soil is altogether unwise.

HEELING IN.

Orders for trees will frequently be filled and consignments arrive at their destination at a time when it is inopportune to plant out in the orchard. In such cases it becomes necessary to protect the roots from the action of the atmosphere until conditions are more favourable. This is done by heeling in, as it is termed—that is, digging or ploughing out a trench in well-worked friable soil. When the trench has been prepared the trees should be laid in, either singly or in small bundles, loose earth shovelled over and shaken in among the roots, and pressed down fairly firmly with the foot.

In the case of oversea shipments, where, as sometimes happens, both roots and tops are dry and shrivelling, it may be necessary to drench the trees thoroughly with water, bury completely for a day or two in moist earth or sand, and then remove and heel in in the ordinary way. By this means, if the shrivelling has not gone too far, the bark will recover its normal condition, and trees may be saved that with less careful treatment would be a total loss.

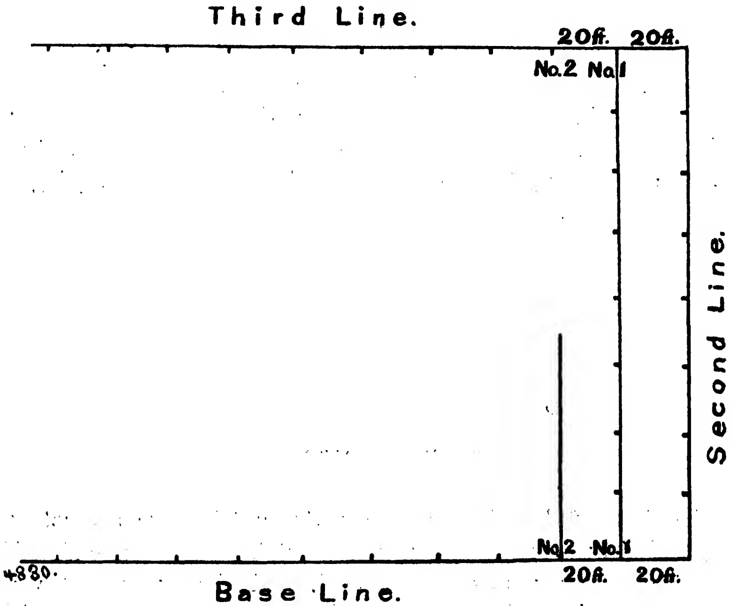
DISTANCE FOR PLANTING.

There has been some difference of opinion as to the most desirable distance which should separate tree from tree and row from row. For most varieties of the different classes of fruits that are grown in New Zealand 18 ft. to 20 ft. apart on the square seems to be very suitable. With the possible exception of lemons and some varieties of pears a greater distance seems to be unnecessary, while closer planting would lead to overcrowding both root

and branch. In view of the fact that thorough cultivation of the orchard is essential to ensure the best results, and also on account of the economy of horse as compared with hand-labour, the system of planting on the square is recommended in preference to some others that have at times been advocated.

Marking out for Planting.

For several reasons, including that of facilitating almost complete cultivation by horse-labour, care should be taken that the trees are planted accurately in line in rows in every direction. To accomplish this by sighting is both difficult and tedious. A simple and effective method of ensuring accuracy is to decide upon a base line,



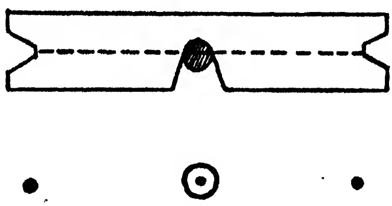
Plan for Orchard-planting.

the position of which will probably be determined by an existing fence or shelter-belt, from which it should be distant 15 ft. to 20 ft. to allow of turning when cultivating with horse implements. Along this base line stretch tightly a measuring-wire—if cord is used for this purpose it is likely to stretch and sag—and drive in pegs at distances of 20 ft. At right angles to the base line stretch the measuring-wire, and peg at every 20 ft. Then, at a 20 ft. peg at a convenient distance from the first-driven corner peg, strike a third line at right angles to the second, opposite to and parallel with the base line. Peg off this third line at distances of 20 ft. All that

will now be necessary to plot off the partly enclosed area is to stretch the measuring-wire from peg No. 1 on the base line to peg No. 1 on the third line, and drive in pegs at 20 ft. distances along the line, transferring the line to No. 2 pegs on either line, measuring off and driving in pegs at the proper distances, and continuing this method until the entire area has been pegged off.

If the work is carefully done, the pegs, which represent the places where the fruit-trees are to planted, will stand in accurate line in every direction.

As it will be necessary to remove the tree-pegs for the purpose of digging the holes previous to planting, it will be equally necessary to be able again to locate the exact position where the pegs stood when the time comes for setting out the trees, or the object of carefully pegging off will be lost. For this purpose a planting-board must be prepared. This should be 4 ft. long and 6 in. wide, of about ¾ in. timber. At both ends and in the centre cut deep notches, the one in the centre about 3½ in. deep or crossing by ½ in. a line drawn down the centre of the board, which is then ready for use. Before removing the tree-pegs for the purpose of digging the



PLANTING-BOARD.

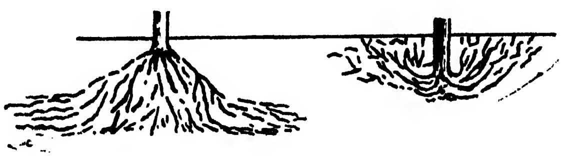
holes, take the board and place the centre notch close against each tree-peg, and drive securely pegs in the notches at either end. The centre or tree-peg can now be removed, and the exact spot where it stood can be determined by replacing the board in the position defined by the two end pegs.

FINDING A RIGHT ANGLE.

It has already been stated that a line should be laid off at right angles to the base line. To do this, take a point 60 ft. along the base line. Stretch the measuring-wire at right angles to this as nearly as the eye can judge. Measure off 80 ft. along this second line. Take the measurement between these two points. If this gives 100 ft., the measuring-wire is correctly laid; if not, it must be adjusted until the correct measurement between the two points is reached.

PLANTING.

Before removing the centre or tree pegs for the purpose of digging the holes, a circle from 20 in. to 24 in. in diameter should be roughly marked off round the pegs, which may then be taken out, and the holes prepared for planting the trees. Taking the circles already marked as a guide, the soil should be removed to a depth of 8 in. to 10 in. As a rule it is desirable that the trees should be planted in the orchard as deep as, but not deeper than, the soil-marks on the trunk show them to have been growing in the nursery, due allowance being made for any possible settling of the loose soil used for bedding the roots and filling in. In the case of retentive clay soils the holes should not be carried below the general worked surface, otherwise pot-holes which will hold water like basins will be formed At the time of planting a small mound of surface soil 3 in. or 4 in. high should be formed in the centre of each hole, upon which the trees should be placed, care being taken to arrange the roots, as far as possible, so that they diverge from the main root-crown at even distances, and also that they will have a downward tendency, instead of, as is sometimes the case, an upward direction towards the surface (see illustrations). This latter is by no means desirable, for fruit-trees should be encouraged to furnish a root-system at such a depth as neither to interfere with cultivation nor compel shallow working on account of the risk of seriously mutilating or disturbing the root-growth. At the same time the root-system should not be at too great a depth from the surface, as in many soils this would place them in a cold medium that may frequently be wet, instead of one that is warm and moist for many months during the year. When planting, the value of the board will be appreciated, for if placed across the



Properly planted. Wrongly planted.

HOW TO PLANT.

hole, with the end pegs standing in the notches, and the tree held in the centre notch while the earth is filled in and pressed firmly over the roots and around the trunk, it will be found that a tree occupies exactly the same position that each of the 20 ft. pegs occupied, and that, without sighting or any other tedious and uncertain method, accurate alignment in every direction has been

secured. For several reasons it is preferred to fill in when planting with the well-worked, friable, and air-sweetened surface soil, instead of replacing the earth taken from the holes, this being disposed of by scattering over the surface in the vicinity.

In order to give the trees the best possible start during their first season in the orchard, the judicious application of a small quantity of manure at the time of planting will prove advantageous. For this purpose a handful or so of superphosphate and bonedust, mixed in the proportion of one-third superphosphate and two-thirds bones, is perhaps as good as anything. This should be sprinkled as the trees are being planted, not over the roots, but in a circle just outside the radius of the shortened root-system, in order to induce the fibrous rootlets that will be formed to push out in search of plant-food, and, after assimilating the manure provided, reach further afield. Moreover, the stimulus thus provided will promote the more rapid production of strong and healthy foliage, upon which the development of both top and root, and the future of the tree, will largely depend.

Root-pruning before Planting.

In lifting from the nursery rows the roots will have been considerably shortened, and sometimes bruised or roughly spade-cut. Before planting, careful examination should be made, and, if necessary, in order to remove any ragged, bruised, or broken ends, the roots should be cut still further back with a sharp knife or secateurs, as this will greatly facilitate the production at an early period of a sound and healthy root-system.

Top Pruning.

It is absolutely essential that all young trees should be cut back either before or immediately after planting. As many growers who plant only for domestic purposes frequently overlook this, it may be as well to give at least two of the most important reasons why it should be necessary to do so. Usually when a tree is received from a nurseryman it will be found that the top growth of the previous season is intact, while the greater portion of the roots have necessarily been removed when lifting from the nursery rows for transplanting. If set out in this form, with spring weather a large number of buds will commence to swell and require a flow of sap to feed them long before a fresh root-system has been formed sufficiently adequate to take in from the soil the plant-food required. The trees so planted, if they do not actually die, frequently so suffer in vitality that they never fully recover. Moreover, in the case of

well-grown nursery stock it is no uncommon thing to receive trees with a growth of from 4 ft. to 6 ft. above the soil-level. If left unpruned, if the tree survived, the main-branch crown would be formed at a height above ground that would be far from desirable, as affording undue exposure to heavy winds, together with increased difficulty in spraying, pruning, and gathering the crop. Therefore, unless a tree has been properly branched in the nursery, to cut back to the height of one's knee is suggested—partly to secure a main-branch crown at a distance from the surface of the ground convenient for horse cultivation, and yet low enough to enable the orchardist to build up an orchard of uniform, compact, sturdy trees that will carry their fruit on well-set limbs, which will not be affected readily by the wind, and partly to restore the balance between top and root, and check the top from starting into free growth until the shortened roots have had time to send out fresh feeding rootlets to take in plant-food from the soil to supply the necessary flow of sap for the young growth that will be formed.

PUBLIC DEMONSTRATIONS IN APPLE GRADING, PACKING, ETC.

During the months of May and June public demonstrations in apple grading and packing, pruning and spraying, and general fruit-culture were given at the following places by the Orchard Instructors :—

Kumeu, Albany : W. C. Thompson.

Hamilton : N. R. Pierce.

Te Awamutu, Te Kowhai, Ngaruawahia, Morrinsville, Te Aroha, Manawaru, Motumaoho, Matangi, Cambridge, Te Kauwhata, Eureka : T. E. Rodda.

Wanganui : W. C. Hyde.

Hastings, Clive, Taradale, Raumati, Dannevirke, Makotuku : J. A. Campbell.

Feilding, Alfredton, Eketahuna, Halcombe, Woodville : G. Stratford.

Stokes Valley, Paraparaumu, Khandallah : T. C. Webb, jun.

Ngatimote, Brightwater, Lower Moutere, Moutere Inlet, Upper Moutere, Richmond, Stoke : J. H. Thorp.

Christchurch, Te Kinga, Southbridge, Kirwee, Sheffield, Bennett's Junction : W. J. Courtier.

Temuka, Glen-iti, Hinds, Waimate, Willowbridge, Waihao Downs, Flemington, Ashburton, Oamaru : A. B. Mansfield.

Dunedin, Invercargill : W. T. Goodwin.

A piece of pumice-stone (about the size of a hen's egg), with a bit of wire twisted round for a handle, makes a splendid torch for burning-off, or to light the house fire. Just dip in kerosene and it will burn for a quarter of an hour.—*C. Pritchard, Parakai, Helensville.*

THE PROGRESS OF MENDELIAN STUDIES IN GREAT BRITAIN.

By R. C. PUNNETT, Arthur Balfour Professor of Genetics in the University of Cambridge, in the *Bulletin of Agricultural Intelligence and Plant-diseases of the International Institute of Agriculture.*

THE dramatic discovery of Mendel's work on plant-hybridization in 1900 inaugurated a new era for the breeder of plants and animals, and the opportunities for advance in the knowledge of heredity were in no country more rapidly seized than in Great Britain. The seed here fell upon prepared soil, for the problems to which Mendel found a key had already begun to engage the attention of Mr. Bateson and of Miss Saunders in Cambridge. The account of the experiments which they had started in 1897 and published as the well-known first report of the Evolution Committee to the Royal Society in 1902 was the most important contribution to the subject since Mendel's own paper, and was the first to open men's eyes to the vast possibilities latent in Mendel's work. A group of workers rapidly gathered round Bateson in Cambridge, and the contributions to be found under the names of Doncaster, Gregory, Lock, Staples-Browne, Miss Durham, Miss Wheldale, and others bore witness to the activity of the rising school of genetics in the University.

All this work, like Mendel's own, was designed and carried out purely with the desire to gain definite knowledge of the workings of heredity, and little or no attention was paid to the economic results which might flow from the application of this knowledge to the affairs of those who bred animals and plants for profit. The material for study was selected on the ground of its cheapness, of the ease with which it could be worked, and of its suitability for giving a speedy answer to the problems put to it. Sweet-peas, mice, stocks, moths, snapdragons, and poultry—such was the material investigated, and except for the last-named it could hardly be said to possess much economic importance.

But it so happened that the stimulus to genetic work coincided with the rapid rise of the School of Agriculture in the University, and the enormous practical importance of the new knowledge was immediately appreciated by Professor Biffen, who was then starting his now-famous experiments in the crossing of cereals. By making use of the methods of Mendelian analysis he was able to show that such qualities as strength, yield, and immunity to rust were transmitted in accordance with Mendel's law of segregation, and consequently are under the control of the investigator, who can now devise suitable experiments for combining them together at will. Improved wheats of this kind have already come into use in England, and, judging by the competition there is to secure the seed, they have already proved themselves a great success. The analysis of the wheat-plant is still being actively carried on in Cambridge by Professor Biffen and his co-workers, and there is no doubt that as time goes on even better and more profitable varieties will be at the service of the British farmer. It is pleasant to be able to record that the importance of the work has been recognized by the Government, who have placed a considerable annual sum at the disposal of the School of Agriculture for research in plant-breeding. This has rendered possible an increase in the scope of the work, and experiments are now being carried out on other plants besides cereals. Among investigations now under way are some concerned with the transmission of fertility in fruit-trees, while the striking success of Biffen's work on the nature of immunity to rust in wheats has led to the search for naturally immune individuals in other forms of plant-life. Experiments with potatoes have been in progress for several years, and, thanks to the energy of Dr. Salaman, working on his own estate near Cambridge, and of Mr. Lesley, of the School of Agriculture, the formation of a decent potato, naturally immune to *Phytophthora infestans*, seems within measurable distance of realization.

Nor are the researches at Cambridge confined to plants. Poultry was one of the first subjects of experiment by Bateson, and during the past ten years much has been learned of the transmission of various characters. Offering as they do a number of features showing sex-linked inheritance, poultry are of importance for gaining an insight into the nature of sex, and of studying the peculiar influence of each sex in the transmission of hereditary properties. Several of these sex-

limited characters are now under investigation at Cambridge, while parallel experiments are being carried on by Professor Bateson at Merton.

Two other series of experiments likely to lead to knowledge of economic value are also being carried on at Cambridge. The first of these is concerned with the inheritance of size, and consists in carefully following out the result of a cross between an ordinary fowl and a bantam. The work is not yet sufficiently advanced to permit of complete analysis, but the nature of the F2 generation raised last year strongly suggests that size depends upon definite factors which exhibit ordinary Mendelian segregation. The other set of experiments mentioned concerns the inheritance of the brooding instinct in the hen and of the brown colour of the egg-shell. In England brown eggs are of greater value than white, but hitherto no breed laying brown eggs and in which the hens never want to sit has yet been established. It may be that brown eggs are incompatible with the non-broody habit, just as it is sometimes stated that a breed of cattle cannot be at the same time first rate in both milk-production and beef. It is hoped that the experiments in progress will eventually give definite evidence upon this point.

Experiments have also been undertaken with sheep where the results of a cross between merino rams (from Australia) and Shropshire ewes are being carefully followed. The experiments have just reached the F2 generation, and it is hoped that the knowledge gained from them will eventually render it possible to combine the fleece of the merino with the good mutton qualities of other breeds.

Besides the work just mentioned, there are other sets of experiments being carried out at Cambridge and Merton which may be regarded as forming a group by themselves. Bateson in 1905 was the first to describe in sweet-peas a remarkable case in which two characters each exhibiting ordinary Mendelian segregation nevertheless showed a peculiar distribution with regard to one another. In this particular instance the characters dealt with were colour, blue being dominant to red, and pollen-shape, long being dominant to round. Blue long × red round gave blue long in F1, and in F2 the expected ratio 3 blue : 1 red and also 3 long : 1 round. But the proportion of rounds among the blues was only about 1 in 12, whereas among the reds the rounds were in excess of the longs to the extent of about 3 : 1. Since that date many other cases of this peculiar association of characters have been discovered in other plants as well as in sweet-peas, and certain generalizations have emerged from the study of them. We now know that if A and B represent two factors respectively alternate to their absence (a and b), then if the original cross is of the nature $AB \times ab$ the characters A and B will be more or less completely associated in the F2 generation, so that of the four possible classes $AB : Ab : aB : ab$ the first and the last will be the most numerous. If, however, the original cross is of the form $Ab \times aB$, then of the four classes in F2 the AB one will be about twice as numerous as either of the two classes Ab and aB, while the class ab will be very rare. Where A and B go into the cross in association they tend to remain associated in F2, whereas when they go into the cross dissociated they tend to remain dissociated in F2. This peculiar phenomenon is not as yet properly understood, and it is with a view to obtaining further knowledge that experiments are being carried on at Merton by Professor Bateson, and at Cambridge by Miss Saunders with stocks, by R. P. Gregory with primulas, and by the writer with sweet-peas.

Recent work, more especially that of Morgan in America, has shown that similar phenomena occur in animals, and there is no doubt that a proper understanding of them will eventually turn out to be of much importance for the breeder of plants and animals. It is a matter of common observation that characters seem at times to be transmitted in bunches, as it were, from one parent or other to the offspring, and it is likely that in such cases we are dealing with phenomena of the kind just outlined.

The best-equipped institute in Great Britain for the study of genetics is undoubtedly the John Innes Horticultural Institution at Merton, near London. Started in 1909 with funds derived from private bequest, it was fortunate in securing Professor Bateson, who left Cambridge in 1910, as its first Director. Fortunately, also, its scope is broad, and the experimental work undertaken is concerned with the unravelling of the principles of inheritance in the widest sense, apart from considerations of direct economic return. Numbers of experiments are at present being carried out by Professor Bateson and his staff, principally with plants, not the least interesting being a series of experiments dealing with fertility and sterility in fruit-trees.

Besides Cambridge and Merton there are several other places where genetic research is being carried on. Mr. Hurst, one of the pioneers in Mendelian studies, has established an experimental station at Burbage, near Leicester, which aims

at the production of economically valuable varieties of plants and animals by working upon Mendelian lines. Mr. Hurst is experimenting with many different plants and animals, and some of his most interesting experiments concern horses, and aim at the production of a pure race of steeplechasers—*i.e.*, of animals with a special aptitude for hunting.

Genetic research is also being carried on by Professor Keeble at University College, Reading, the chief material investigated being primulas. But perhaps the most interesting work from this source is that dealing with the chemical side of genetic problems. It is well known that in primulas there are white flowers of two kinds—viz., those dominant and those recessive to coloured. Professor Keeble and Dr. Armstrong have recently amplified the work of Miss Wheldale and others, and have demonstrated that these two forms of white, though alike in appearance, can be distinguished by definite chemical tests. Such work opens up a new and important field of study, and it is possible that as this branch of knowledge develops the genetic analysis of plants and animals will be greatly simplified by the substitution of direct chemical tests for the elaborate series of breeding-experiments which are at present necessary.

Among the experimental work in progress in England should be mentioned that of Mr. Staples-Browne, of Bampton, near Oxford, who is continuing his researches with pigeons, more especially with reference to sex-limited characters; also the work of Trow, of Cardiff, who has recently contributed a valuable paper on inheritance in *Senecio*. In this paper and in another shortly to appear Dr. Trow has made a definite advance in the understanding of those peculiar cases of association between characters to which reference has already been made.

In Ireland, Professor Wilson, of Dublin, has lately brought together a number of records dealing with the heredity of coat-colour in cattle and horses and with the milking-capacity of cows.

Scotland has also made a start by creating a Lectureship of Genetics in the University of Edinburgh, to which Mr. Darbishire was recently appointed.

In conclusion, it should be mentioned that the study of genetics in Great Britain is not confined to those who work on these islands. Cambridge sends her students all over the world, and the value of genetic research to the breeder is evidenced by the work of Balls on cotton in Egypt, and by that of Leake and of Howard on cereals, cottons, and other plants in India.

SAND-RECLAMATION.

NEW METHOD FOR THE AFFORESTATION OF THE SANDY PORTIONS OF THE GREAT HUNGARIAN PLAIN.

Abridged report of Ferencz Kiss (Chief Counsellor of the Department of Water and Forests) in the Bulletin of the International Institute of Agriculture.

THE report was presented on the 14th March, 1913, to the National Forestry Society, and deals with the afforestation of the sandy parts of the Great Hungarian Plain. This afforestation was intended at the beginning to protect the neighbouring pastures and cultivated land from the encroachment of the moving sands of the adjacent steppes. The work was begun a hundred years ago, and its economic utility was only considered after the continued labours of a century had unexpectedly been crowned with success. At first black poplars were planted, and it was only in 1870 that *Robinia* took exclusive possession of the wooded portions of the Alföld. The writer gives a biological study of the flora of the Great Hungarian Plain, including *Robinia*, which tree, in his opinion, is not capable of improving the poor soil. He recommends a new method, which does not confine itself to the afforestation of land suitable for tree plantations, but extends to the reclamation and improvement of a large portion, consisting of sandy soil and sandhills, which hitherto has been little used owing to the poverty and dryness of the land. The writer attests the excellence of Austrian pine for preliminary planting, as it renders the soil suitable for the cultivation of more remunerative forest-trees.

THE HEMP INDUSTRY.

W. H. FERRIS.

UNSATISFACTORY QUALITY.

UNFORTUNATELY for the industry a high percentage of the hemp graded last month was of a distinctly unsatisfactory character, owing to the large amount of diseased leaf being worked. This, however, applies principally to the Manawatu district. Very little fault can be found with the work of milling, except in regard to scutching, where carelessness resulted in many lines containing an undue proportion of "tow-balls" and "taily" ends. This trouble can only be regarded as one of the evils of the contract system. In the rush to get through a large amount of material the quality of the work is ignored. It is to be regretted that many millers do not realize the importance of keeping really badly diseased leaf separate from the better quality. They overlook the fact that the value of the line must be determined by the most inferior portion. That is the principle on which the trade buys its raw material, and it is the principle which must be largely observed in the work of grading. In many cases the large percentage of really diseased and practically weak hemp included in parcels has resulted in the exportation of hemp which can only bring discredit on phormium-fibre on oversea markets. It is questionable if it really pays to mill some of the badly diseased hemp at present being utilized. In a few cases which came under my notice during the past month it would certainly have paid the miller to have discarded a good percentage of his leaf, as the higher value of the remaining fibre would have more than compensated him.

IMPROVEMENT AT AUCKLAND PORT.

Hemp received during the month at southern grading-stores was of a satisfactory standard, except in the case of the Bluff, where the quality on the whole leaves much to be desired, especially as a good proportion of it is rather short in length. It is satisfactory to know, however, that a number of the district millers I have interviewed expressed their intention of aiming at a better standard next season. At the Auckland port, where so much unsatisfactory hemp has come forward for shipment this season, some improvement

is noticeable. A shipment of 175 tons of decent good-fair hemp was shipped from Auckland for Canada last month. The milling-work of this province is of a rather in-and-out character, some mills doing good work and others very poor work. The inferior quality being milled is due entirely to poor work in the mill itself, as the bulk of the leaf being produced in Auckland is of a distinctly good quality—long, good, clean fibre-producing leaf. The payable prices being received and the decidedly good returns secured by those millers who are turning out a good marketable article has convinced many millers that it pays to do the work well, and I was assured by quite a number of them during a recent visit to the north that they intended to aim for good-fair quality next season. With this object in view they purpose installing the latest labour-saving devices. That the industry has taken a new lease of life in the north is proved by the fact that several of the mills in that part of the Dominion are now thoroughly well equipped, and have the means at hand to turn out the very highest quality of fibre.

WORTHLESS TOW.

In Auckland, as in the majority of the other hemp-milling districts in the Dominion, the tow produced is most unsatisfactory, millers failing altogether to appreciate the necessity of marketing this in decently clean condition. They seem to be under the impression that rubbish and dirt constitute tow, and that these have a marketable value. In the Manawatu the tow in some cases is almost worthless, owing to the badly diseased condition of the leaf from which it comes. It is to be feared that tow will rapidly go out of favour with the manufacturers abroad if improvement be not effected in the quality of the article exported.

STRIPPER-SLIPS.

No stripper-slips are coming forward. The decline in market value and the higher freight ruling are, no doubt, the contributing causes.

According to an official report received by the United States Government from the executive authorities of the Philippine Government respecting the damage inflicted upon the hemp crop by the typhoons which passed over the Vifayan Group of the islands towards the end of last year, the damage suffered by the hemp crop was not serious. In fact, the United States Department has now received an unofficial report to the effect that in December last the prospects of a successful crop of hemp were excellent.—*British Board of Trade Journal.*

THE APIARY.

F. A. Jacobsen.

The present period is the time to prepare your bees for the honey-flow, and the success of the coming season will depend considerably on the treatment and preparation given to the bees during the autumn. If the colonies have been left with plenty of stores and kept warm and dry they will build up in the spring very rapidly and soon make large powerful colonies; but if this be not the case, feeding will have to be resorted to and money and labour expended. Breeding will now have been started in the majority of colonies, and it is important that care should be taken to provide sufficient stores to maintain the strength of the hive.

During this month look out for any leaky covers, and have them repaired as soon as possible. It is very uncomfortable for the bees and unprofitable for the beekeeper to tolerate damp mats and leaky covers. Remove them as soon as possible and endeavour to keep your colonies dry. An extra mat at this period would be very beneficial to the colony, as the warmer you keep your bees the sooner they will start to breed in the spring.

On no account place a sealed comb of honey in the middle of a cluster, as this would considerably lower the temperature in the hive and perhaps cause the bees to perish. Place the comb always at the side.

The Queen.

When examining hives, which should be done during fine weather this month, you will notice the queen has already commenced laying, and two or three frames will contain brood in a circular patch. This will indicate that the colony is in a prosperous condition. Should no brood be found it is advisable to search for the queen, as no brood at this period would lead one to believe the colony to be queenless. After a thorough examination, if no queen be found but the colony be otherwise in good trim, healthy, and with a sufficient supply of stores, a new queen should be introduced as soon as possible. Should the colony be weak it would be better to unite it with some other weak colony which has a queen.

These two, by combining their forces, should build up to a strong colony and eventually gather a surplus of honey.

A simple method of uniting is to place one colony above the other with a sheet of newspaper between. The bees soon eat through the paper, and thus mingle gradually, no fighting taking place.

SPRING STORES.

Perhaps the main reason why colonies should be examined now is to ascertain if they have sufficient stores of food to enable them to continue breeding. It will not pay to stint your bees for food during this and the following months. It is from now on, when the colony is building up to some degree of strength, that the bees require an abundance of food to nourish the larvæ. In the case of colonies being short and frames of healthy sealed honey not being available, sugar syrup should be fed (directions in regard this were given in the March issue of the *Journal*). If a frame of honey be inserted, place it near the side of the hive, and not in the centre of the brood nest.

FOUL-BROOD.

When examining colonies keep a strict lookout for any signs of foul-brood. Suspicious cases should be watched carefully or treated. During the spring months is the best time to cure this disease.

MOVING BEES.

Hives of bees which it is intended to move should be moved at once. Do not delay this work unless the bees are to be shifted a long distance. In the latter case wire screens should be utilized in place of the cover and bottom board, in order to secure plenty of ventilation. All shifting should be done before the breeding is at its height and when the colonies are light in stores. It frequently happens when shifting bees heavy in stores that combs are broken down by jolting over rough roads, and the queen killed. The colony is thus enormously handicapped for future development. Getting the bees excited by rough usage will cause overheating, which may affect the larvæ to such a degree as to suffocate them. If bees are to be railed, place the hives with the frames parallel with the rails in order to receive the jolting caused by shunting on their ends, and so avoid the swing and consequent killing of bees, which would happen if placed crosswise. For a short shift wire screens are unnecessary, and the hives may be closed up by tacking a strip of perforated zinc over the entrance.

ORCHARD WORK FOR SEPTEMBER.

W. A. Boucher.

Cultivation.

The cultivation of the land is one of the most essential features of orchard work. In the early part of every season ploughing and, if necessary, cross-ploughing, together with thorough pulverization of the soil with disc or tine harrows, should be carried out. Following upon thorough work in the early part of the season the use of the cultivator at reasonable intervals will prevent any growth of weeds or grass and maintain the soil in the most suitable condition for the growth of the trees and the maturing of fruit crops.

Planting.

Fruits that blossom early, such as peaches and nectarines, should, if climatic conditions were favourable, have been planted in August. Sometimes, however, during that month frequent rainfall in some localities, especially where the soil is of a retentive nature, renders fruit-tree planting altogether unsatisfactory. Under such circumstances planting can be deferred, for, although the blossom may be showing, better results will eventuate from late planting in soil which is warm and moist than from earlier planting in soil that is sodden with water.

Spraying.

Mussel Scale and Red Spider.—If spraying for the control of these pests should not have been carried out earlier, it may still not be too late in some localities to apply the red oil effectively and yet safely. But it is always important to bear in mind in connection with the use of red oil for spraying purposes that the trees should be dormant and the buds closed at the time the application is made.

Fungus Diseases.

Apple-scab (*Fusicladium dendriticum*) and pear-scab (*Fusicladium pyrinum*), sometimes called "black-spot," are generally prevalent. The most satisfactory means of controlling these sometimes troublesome diseases is by spraying with the Bordeaux mixture, 10-10-40 formula, when the buds have commenced to swell. After the appli-

cation of this strong compound it will be found that the above-mentioned diseases will prove less troublesome, and that the application of the Bordeaux mixture, 4-5-50 formula, after the fruit has set will almost entirely prevent malformation and consequent loss of crop.

SCALE INSECTS ON CITRUS-TREES.

Kerosene emulsion is recommended for the control of scale on citrus-trees. Proportions: Kerosene, 2 gallons; common soap, ½ lb.; boiling water, 1 gallon. Preparation: Place the soap in the water, which should by preference be rain-water. Hard water is unsuitable, but if only such is to be had, make it soft by adding some soda. Boil till the soap is thoroughly dissolved; then take it off the fire and pour the solution into the kerosene; thoroughly churn up by placing both suction and delivery ends of the spray-pump hose in the liquid and pumping steadily for a few minutes. The emulsion should then, if perfect, form a cream, which thickens on cooling without any appearance of free kerosene.

GRAPE-CULTURE.

S. F. ANDERSON.

VINEHOUSE WORK FOR SEPTEMBER.

IF the house have been closed up in July the vines will be putting forth young leaves this month. A little flower of sulphur should be dusted on the shoots. Select a fine day when the shoots are dry for this work. The afternoon is the best time. Mildew may not appear, but do not wait to see it. Sulphur is a preventive as well as a cure. It may be applied at any time; there is no objection to putting it on even when the vine is flowering. The finer the powder the quicker is its action. Read notes on sulphuring in the March issue of the *Journal*

The gradual rise in temperature will hatch out any mealy-bug eggs that may have escaped notice in the general cleaning-up and painting of the rods. Keep a good lookout for these, and touch them with methylated spirits when seen, as no cyaniding should be done until the fruit is nearly full grown.

Ventilation must now be carefully watched. If the weather be mild a little opening of the top ventilators may be permitted during

the night. The bottom ones must not be used at all during the growing season. What is to be avoided from the time the fruit is being formed and up to the time of colouring is allowing the house to get too hot and then opening the ventilators wide to lower it. The supply of air should not be given so much for lowering the temperature as preventing it from rising too high. As the days lengthen the time for closing will be, of course, a little later—from 4 o'clock to 5 o'clock.

The grower should bear in mind when cultivating plants under glass that, although he is growing them in a high temperature and protecting them from sudden climatic changes, he must maintain, as far as possible, the natural conditions they would obtain in an ideal climate. If the matter of ventilation be attended to there is less chance of mildew, and he will get his grapes to ripen at an earlier date than the grower who is less careful, and this means, generally, more money for his fruit. On exceptionally hot days the temperature can be kept down by watering the paths occasionally. Provided, however, good top ventilation be given, there is not much to fear from hot bursts of sunshine now and then.

Give the vines ample borders inside and out, and keep them in a high state of cultivation. Mulching the outside, although not essential, assists to maintain a more regular moisture-supply in a hot summer. This, however, should not be put on until hot, dry weather has set in—say, in November. Frequent hoeing of the soil just an inch or so deep is the best stimulant for all growing plants

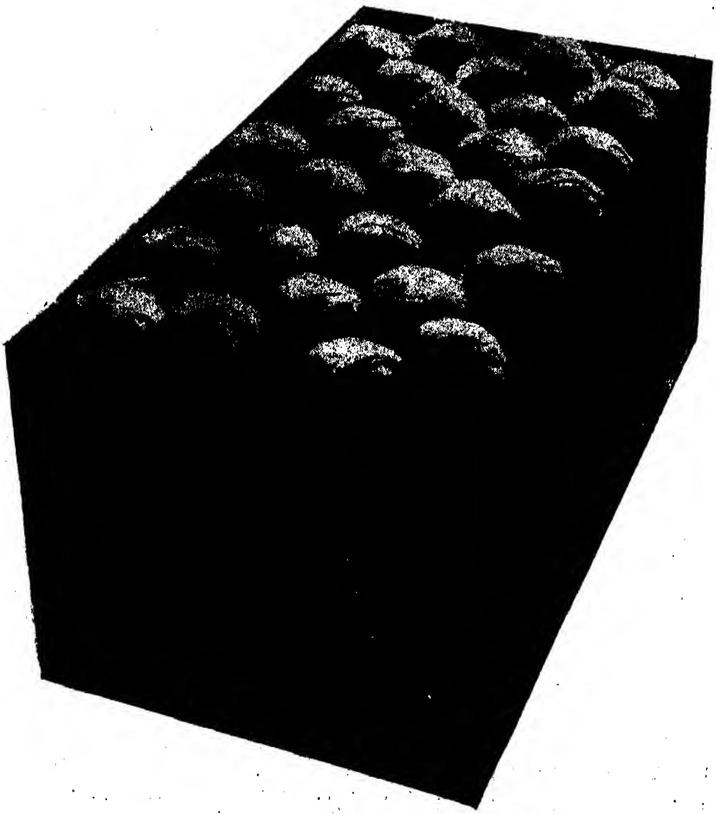
Before attempting disbudding or, in other words, the reduction of the shoots, let all of them grow till the fruit is quite developed. This will be when they are 6 in. to 9 in. long. Then select the strongest, the one in the best position and nearest to the vine-rod. In breaking out the superfluous ones care must be exercised not to injure the shoot which is to be retained, as this is very easily done. Should there be any risk of doing this, do not break them out, but pinch off with the finger and thumb, leaving an inch or two. This will probably wither. In any case it is easily suppressed.

Sometimes in the colder districts of the South Island frost will cut the young shoots even under glass and cause serious loss. To guard against this, a kerosene-heater, one for about every 2,000 cubic feet of space, would prevent such loss. See that the heaters are filled, well trimmed, and kept clean to prevent smoking. They should be so placed as not to be too near the vines, otherwise the fumes will cause injury

NEW APPLE-CASE.

DESIGNED BY ORCHARD INSTRUCTORS OF THE DEPARTMENT.

BELOW is a photographic reproduction of the apple-case designed by the Orchard Instructors of the Department in order to secure effectiveness and simplicity of packing. The case has also other advantages. It holds an imperial bushel of apples; it opens up



well (showing off the fruit to the best advantage); and for carriage by sea it reduces waste space to a minimum, as it is possible to stow twenty-five to the ton measurement, against twenty-three of the case now in general use.

THE FARM GARDEN.

W. H. Taylor.

Vegetable-culture.

Asparagus.—Asparagus usually begins to push up during September, and beds should be put in order at once, for the crowns get soft some time before the head, and injury may ensue by working among them too late. The old practice regarding very large quantities of manure being given during winter is now to a large extent abandoned. Nevertheless, it would be useless to expect good heads without plenty of manure. It is, in fact, a plant which, like rhubarb, can hardly be overmanured. Nor must it be imagined that artificial manure alone will suffice. There must be a liberal addition of organic substances or the soil will become inert, and inorganic fertilizers will prove ineffective. The great variance of the modern ideas from the old is that it is considered that an inordinate quantity given at one time is to a large extent wasted, as, being more than the plants require, a large amount is washed away by rain. A more moderate dressing in winter or early spring is now advised, to be followed by another dressing when cutting ceases for the season. This promotes good summer growth, and it must surely follow that good heads will come the next season, because next season's heads for cutting will depend solely on the class of growth made during the coming summer. A moderate dressing of stable manure may follow a dressing of salt up to 8 oz. per square yard. Nitrate of soda acts as an insecticide as effectively as salt, if it be more convenient to use the nitrate. Give 4 oz. per square yard, but it will pay to use the salt as advised, and give nitrate when cutting ceases. It may be as well to say that nitrate of soda will in nowise take the place of manure, its office being merely to make the manure more effective. It would be useless to apply nitrate of soda to soil destitute, or nearly so, of manure proper. Before applying manure to the bed it should be cleared of weeds, and, if the soil be close, lightly point it over with a fork. As what constitutes a liberal dressing of manure may be construed differently, I may say that the old method was to give a layer 10 in. or 12 in. thick, the manure being used rather fresh and always littery. Of course,

it went down to very little, and less than half that quantity is sufficient to give now. It is advisable to use manure with a fair amount of straw, so that there are some vegetable remains, which help to keep the surface soil loose. And here it is best to say that the kind of soil the plants are in may not only admit of some variation from the above directions, but may actually render it advisable. If the soil be of a very light or sandy character, more solid manure should be used. In such cases cow-manure, or the cleanings of pigsties—in much smaller quantities, of course—would be good, as there would be no straw to decay away. New beds may be planted now and until the heads begin to show. It is best to plant just as growth is getting active, because there is then no loss of roots from decay. Even damaged roots survive when growth quickly follows transplanting. Full details for planting were given in the *Journal* of August, 1912.

Onions.—While it is very bad policy to sow any kind of seed when the soil is not in a fit state to receive it or until continual growing weather can reasonably be expected, it is equally bad to delay when conditions become favourable. This is particularly the case with onions. It may be considered an axiom that the earlier a start is made the better are the chances of a good crop. In many places seed will be up already; in others it will not yet be in the ground. In this district some growers for market do not sow till well into September. It is a misfortune to have to sow as late as that, and yet it must be said that it is better to be too late than too early. In the latter case the seed often comes badly, resulting in patchy lines, whereas when sown late it is fairly certain to take well. The trouble is to obtain size, and even proper maturity. The best treatment for the soil naturally differs with various classes of soil, but in all cases a firm seed-bed should be the object sought. Ploughing in a crop of green oats—a favourite practice—just before sowing is not good husbandry. If the crop be of sufficient bulk to be of value, it will cause the soil to lie light for a time, with some degree of settling down after. This, of course, happens in a somewhat irregular manner, as the oats are certain not to be distributed quite evenly, but rather inclined to bunch up. This causes unequal settlement and loss of seed. The evil is greatest on light land. Heavy soil lies more solid, and there is less after-sinkage. There is another reason why the crop should be turned in earlier—viz., that it may by decay be converted into humus before the seed is sown; as it is in that condition that it supplies food for the plants. Fresh manure in which there is much straw would for similar reasons be bad, but to a greater degree, for the ripe straw would

be longer decaying than green oats. However, in heavy land it would have good effect if it could be worked in, so as to avoid bunches. In garden-work this would best be effected by using a fork for the digging instead of a spade. The material could then be worked in in such a way that it would lie between the spits as well as below them, and thus aid in the aeration of the soil. Where seed is up, efforts should be made to keep the surface loose. It is unwise to weed during wet weather or to touch the soil in any way; but the surface should be loosened as soon as possible when it has dried after rain.

Cabbages and *cauliflowers* are at this season very prone to bolt to seed. This is due mainly to halting growth. A little nitrate of soda usually gives them the fillip they require. The easiest way to apply the nitrate is to crush it into a fine state and mix it with dry wood-ashes. Mix the nitrate very evenly with the ashes, and arrange so that a handful of the ashes contains about a good teaspoonful of nitrate. A handful thrown round near the stem of each plant will be sufficient. It should be applied during rain.

Much of the work appropriate for the past four-weeks period, such as preparing ground for summer crops and sowing certain seeds, may have been deferred till now with perfect propriety, but should now be treated as imperative. Seeds to sow will include Early Shorthorn carrot, lettuce, radish, turnip, peas, celery, tomato, leeks, cabbage, cauliflower, broad beans (if required), parsley.

Celeriac — turnip-rooted celery — is not very generally grown in this country, probably because it is not well known. It is a really valuable winter vegetable, and worth a place in all good gardens. Those who are accustomed to soup, &c., flavoured with celery seed or leaves would find celeriac a vast improvement. It is also very delectable stewed as a dish. Celeriac is grown in a manner similar to celery up to planting-time. This will be dealt with at the proper time. Both this and celery should be raised in boxes for early crops, but later crops may be provided for by sowing in the open ground provided suitable soil be available. It is useless to sow celery-seed in soil devoid of humus. I have tried several times to raise them in that way here, but have failed utterly, although for years previously I raised all my plants in that way in soil well supplied with stable manure. For the busy man open-ground raising of the plants is a boon, as it saves a lot of time. When seed is sown in boxes the soil should be light and free, with a good supply of vegetable matter, either leaf-mould or old manure. It is customary for writers to advise

sowing the seed thinly, but I doubt if any one ever does it. The important thing is to prick off quickly before the young plants become drawn.

The same remarks apply to *tomatoes*. As soon as the young plants can be handled they should be pricked off. A cool house or frame is a suitable place to raise the seed.

Leek seed should be sown in drills for transplanting later. It is sometimes advised that they be sown broadcast in order to prevent overcrowding. This plan will answer only on soil that is free from weed-seeds. In any case the importance of not overcrowding, although good theory, is certainly overestimated. I have experienced no bad results from taking plants from crowded lines.

Peas should be sown twice a month. Only the tallest varieties remain in full bearing longer than two weeks, and these are seldom grown because of the difficulty of providing tall sticks.

Lettuce seed should be sown to provide plants for a moderate planting. It is best to sow little at a time and often from now till midsummer.

Cabbage and *cauliflower* seed may be put in now or during the next six weeks to provide heads about midsummer.

Red beet of the turnip-rooted kind may be sown for early use.

A number of inquirers ask how to grow *onions for pickling*. The most important point to remember is—do not sow the seed until November. In due course the cultivation necessary will be detailed.

Cucumbers and *melons*.—Most people in this country are content to get such of these as can be grown in the open ground. At any rate, this is so over a large part of the Dominion. But some have not the climate to grow them outside, while others wish for something better. The initial steps in the frame cultivation of both are the same, although their subsequent treatment differs very materially, as will be shown in future issues of the *Journal*. Bottom heat is necessary to raise the plants. This is provided for by a dung bed. Turn the manure, which should consist of fresh horse-droppings with a liberal amount of straw, a few times before making up the bed. The turning ensures uniformity in the fermentation and counteracts any overheating in the heap. Cover the manure inside the frame with a layer of light soil to keep down rank vapour. After a few days sow the seed in thumb-pots filled with loamy soil, putting two seeds in each pot in case one should fail. Cut one off if both come safely. Then plunge the pots in the bed. When the roots have filled the pots, shift to 5 in. pots. The soil should be turfy loam with

a little old manure or leaf-mould. Then plunge again. As soon as the plants begin to grow, pinch the top off each. Meanwhile prepare larger beds to grow the plants in. It should take two weeks to prepare the manure for a large bed. Further details will be given next month.

SMALL FRUIT.

Strawberry beds should all be put in order now. It is customary to let weeds grow in the colder months of the year, many growers being of opinion that it is better to leave them than to work the ground during winter, and that the pulling of the weeds between the plants at this time does good by breaking up the soil. This may be right in some cases, particularly where the soil is heavy, but freedom from weeds and a good mulch of manure would be better in the majority of cases. After getting the beds clean a mulch of manure may be given with advantage. Stable manure is not always obtainable. Soot is a most valuable fertilizer for strawberries. In fact, it is so valuable that it would be worth taking some trouble to obtain it, particularly as it is one of the best insecticides—a very important consideration. Slugs are a terrible pest on a strawberry-bed, but they are never found in numbers where soot is liberally strewn. Equal parts of kainit and bonemeal, at the rate of 3 lb. per square rod, may be applied at once. A month later nitrate of soda, 2 lb. per square rod, may be applied. It is not too late to plant strawberries, but there should be no delay.

Cape gooseberries may be planted as soon as danger from frost is past. Old plants that have been cut down by frost and have new shoots at the bottom should be freed from the dead tops. Where they are not injured by frost cut the plants down to within 8 in. or 10 in. of the ground.

Finish all work in small-fruit plantations at once. Weeds are grown at the expense of the fruit, and cleanliness and good cultivation pays here as elsewhere.

FLOWER-CULTURE.

This may be made to be a busy time in the flower-garden; there are so many things that may be done. Planting of all perennial summer plants should be finished as soon as possible, and this class includes a large number of plants.

Carnations should be planted forthwith. There are more ways than one of treating carnations; certainly more than one good way. It is, however, a matter in which circumstances count. The

great desiderata are — a sound, substantial soil which will not bind with sun or rain, perfect drainage, deep cultivation, and something below the top spit for the roots to find in summer-time. It matters little whether the plants be put out in autumn or nursed in an auxiliary spot till spring, but the latter plan is decidedly better under many circumstances. It affords opportunities to work the ground and to have it quite fresh and sweet in spring, when the plants can be put out with scarcely any check. Put the plants deep enough in the ground for the lower grass to rest on the surface, and press the soil firmly around the roots. A liberal dressing of soot is beneficial, and has the effect of increasing the vigour of the growth and enhancing the quality of the flowers.

Japanese iris require well-manured ground. Light soil which dries in summer is not suitable for them, because by nature they are bog-plants. They like their heels to be in water and their heads in the sun. Therefore choose for them open, sunny places with good holding soil. An excellent position is the side of a stream or the margin of a pond.

The tall-growing, scarlet-flowered lobelia, *Lobelia cardinalis* (the cardinal flower), is a very old garden plant that is seldom well grown. It pays well for a little extra care. Moisture and sun are necessary to it. The plan has been adopted of encircling the clumps with a little wall of clay, so as to form a basin. This enables the grower to give copious supplies of water, and it is possible by this means to get spikes 5 ft. long, whereas they are usually about 1 ft. high. The flowers of this lobelia are said to be the truest scarlet seen in any flower, just as *Salvia patens* is the truest blue, and this is well worth growing.

Another attractive plant that may be put out now is *Francoa ramosa* (bridal wreath). It also requires good soil and manure. Under these conditions it will throw flowering-stems 4 ft. long. It is then valuable for cutting for floral decorations, besides being handsome in the garden.

Provision for the summer and autumn display of annuals, &c., must now be under way, as well as the disposal of plants raised in autumn.

Pansies, every one alike, even the very best of them, have a very annoying way of dying off. Some of the high-class varieties seldom produce seed, and if they die they are lost altogether. I have found such varieties do best in a semi-shady position—that is, where the sun reaches them part of the day only. Naturally, such a position is comparatively cool, which is what they want.

The time at which half-hardy annuals are sown should be ruled to some extent by the purpose for which they are intended.

Where they are to fill beds that are now occupied by spring-flowering plants, wallflowers, &c., they will not be wanted very early; probably not until the beginning of December. For such purposes it will be time enough if the seed be sown at the end of September. This refers to nemesias, asters, marigolds, and suchlike. But for ordinary work the plants should be ready earlier. Sow at once, for it is best to give the plants time to make plenty of roots before they are put out. It is better to sow too early than a little late. Salvia Bonfire is a plant much fancied. To get any good from it the seed should be sown at once. Plants raised late never make growth enough to be of any service.

Chrysanthemums.—Keep the young plants in a nurse-bed till the end of October, but, in the meantime, get the ground ready for them. Work the ground deeply and manure well. Wood-ashes and soot are good for them, particularly soot, which helps to clear away slugs, &c., and is a powerful stimulant to these plants.

Divide old *dahlia* tubers into small pieces. Keep a piece of neck to each division, and bed them in a piece of free soil to start.

DEMONSTRATION OF MOTOR-PLOUGHING BY THE RUMELY OIL-TRACTOR, WERAROA EXPERIMENTAL FARM.

THE POULTRY INDUSTRY.

F. C. BROWN.

BROODING PROBLEMS.

WHILE the quality and constitution of the breeding-stock determine to a large extent the character of the chickens produced, satisfactory progeny depends on something more than mere parentage. A high-type layer cannot be bred from mongrel stock, but birds from the best foundation blood in the world will prove disappointing if they be not fed well and handled carefully in the critical days of youth. At the present time we have three rearing agencies—the natural mother, the artificially heated brooder, and the cool, or fireless, brooder. With all the advancement that has taken place in the artificial production of chickens nothing has yet been discovered to improve on the natural mother, provided, of course, the hen be allowed to hatch and rear her chickens under favourable conditions. Very often the hen fails, but this is due largely to the fact that the hen has been asked to do her duty under adverse conditions. Recently I met with an instance of eggs failing to hatch under a hen, but the nest-box was nailed to a wall several feet above the ground and the chicks were dried up in the shell—a good example of the importance of moisture in hatching operations.

In using a hen natural conditions should be provided so far as is possible; in any case nothing but a little hay should come between the eggs and the earth, and if there be some moisture in the earth so much the better. Then, towards pipping-time it is advisable to lift the hay, or whatever nesting-material is used, and moisten the earth. Remember that in a state of nature a hen has means of obtaining the necessary moisture which she seldom has with the present more or less artificial conditions under which she is managed. The common trouble of dead chickens in the shell is due almost invariably to the want of moisture, especially near hatching-time. It is imperative, where the hen is used, to see that she is not troubled with vermin. Many fowls leave their eggs just when these are on the point of hatching because they are pestered beyond endurance by lice. She is probably shut up in a small enclosure where she has no means of dusting herself, and, even if free of vermin that live on the body, the debilitating red mite may be present, and, if so, it is surprising if the hen can persist in her hatching-work. Obviously hatching should be done well away

from the roosting-quarters. These, however clean they look, should be well disinfected before the hatching season commences and the hen well dusted with an insect-powder before being placed on the eggs. It has to be remembered that a bird on a nest, especially when hatching, is in the most favourable condition for the development of undesirable insect-life. If the bird which has been troubled with vermin should hatch out her eggs successfully, the chickens are at once a prey to them, and may never thrive properly. Be careful not to powder the hen just after the chickens are hatched with anything of an irritating nature, as this may possibly get into the eyes of the little ones and blind them. The same treatment of the hen as outlined above is necessary if the chickens are to be vigorous from birth ; and in handling a large number of birds for profit it is imperative that they be started well and develop without check. It is waste of time to doctor weaklings. In nature it is a case of the survival of the fittest Only the strong reach maturity, and consequently only vigorous birds are permitted to perpetuate the species.

In artificial rearing how many lessons we may take from the mother hen! If a shower of rain come on at feeding-time she does not allow the chicks to feed in the wet. Her whole endeavour is to get them under her wings, and by imparting her body-heat to make them warm and comfortable. In bad weather it is surprising how little food chickens running with a hen obtain, and yet they develop remarkably well. The palpable lesson is that warmth, and this at a uniform temperature, is more essential than feed. Herein is seen the prevailing weakness in artificial rearing. The chickens seldom enjoy that absolute uniformity of warmth which they receive when reared in the natural way. The hen studies weather-conditions, and so must the poultryman who would rear successfully. No matter whether a heated or a fireless brooder be used, variation of temperature is the chief cause of failure. One has only to study the chickens coming out in the morning from a well-made and properly ventilated brooder and compare them with chickens leaving a badly constructed and poorly ventilated brooder to realize what the maintenance of a proper temperature means. The experienced man entering a brooder-house at night can tell at once if the chicks be comfortable by the nature of their chirping. The heat may be insufficient, and they will be huddling together or pressing one another aside in the endeavour to reach the warmth their bodies demand. This discomfort and consequent huddling leads to the birds getting in a sweated condition, and when they leave the brooder in the morning they are highly susceptible to chill. On the other hand, the artificial heat may be too high (perhaps by reason of a hot night following a cool one) and they sweat again, the

consequent chill following when they come in contact with the lower temperature of the brooder-house in the morning.

The evil of chill in the brooder is, of course, intensified by overcrowding, and overcrowding is one of the most common mistakes made in handling poultry. Never be tempted to put in "just a few more." Work only with numbers that can be handled with absolute confidence. How frequently it happens that from seventy to seventy-five chickens are placed in a brooder having a capacity for only fifty, and by the end of the week or the tenth day the number has dwindled till no more than about the correct fifty remain, and these are probably not as chirpy as they would have been had they had the brooder to themselves from the commencement! I have often been tempted to advise poultrymen I have visited to put a sign over every doorway and gateway on the plant —"DON'T OVERCROWD."

I must refer again to another great cause of mortality and loss of money—dirt. It is when overcrowding accompanies filthy conditions that extreme results follow—disease and disaster.

Returning to the question of chill, which is the most common trouble in artificial rearing, and which happens even where there is no overcrowding and where cleanliness is rightly appreciated, few poultry-keepers realize how many phases of sickness in chickens this is responsible for, or how many things may bring it about. The chickens may have diarrhœa, or spreading of the legs—the chief results of chill. The most common indications of chill are loss of appetite, excessive thirst, no inclination to leave the brooder, and (if compelled to go in the run) huddling in corners. Affected chickens have also a cry which cannot be mistaken. Reference has already been made to the usual causes of chill, but it is well to emphasize the necessity of the very greatest care in seeing that the chickens are not subjected to extremes of temperature, and that when they have to be inured to natural conditions the process should be made as gradual as possible. The chickens need the most careful watching to see that the conditions are at all times favourable to their development, and remember the important influence of prevailing weather-conditions on the work of brooding. Take the old hen as your example.

As to the correct temperature in the brooder, the degree advised —90—will generally be found satisfactory. There is no better guide, however, than the behaviour of the chickens. If these be well spread out and look comfortable it may be taken for granted that the heat being maintained is correct. If the chickens are seen to be huddling, more heat is required; while if the heat is too great they will be gasping for breath, in a lesser or greater degree. and be crowding to the ventilation-spaces.

THINGS TO REMEMBER.

Don't use old brooders without disinfecting them.

Chicks require a good deal of nursing for the first eight days.

Use only the most reliable brands of food in chicken-feeding.

Keep a keen lookout for vermin at all times.

Even temperatures, good ventilation, and cleanliness are essential factors in successful chicken-rearing.

Keep the chicks in the brooders for the first three days, and then give them only limited space in the runs until the third week.

In feeding, supply the food at regular intervals, but keep clean water always before the chickens.

Grit, charcoal, and grain food are essential to the well-being of chickens.

Keep the chickens always busy. A little chicken-feed thrown in the chaff litter will induce this.

Don't take the whole of the heat off the brooders, even on fine days.

If chickens get a chill it is generally three days before they exhibit pronounced symptoms of it.

Chickens that receive a severe setback do not develop into profitable stock.

LUCERNE AS A POULTRY-FEED.

C. J. C. CUSSEN.

SINCE the patch of Hunter River lucerne (about one-fifth of an acre) was sown in the poultry section of the Ruakura Farm of Instruction I have received many inquiries regarding its utility as a ration for poultry. We have no definite data as to its value when compared with other green plants for poultry-food, but the following remarks are offered as the result of the writer's observation of the good effects following on its use.

All poultry-keepers know how poultry relish most green stuff, but it is doubtful if all are aware what an important part this item of food plays in the health and general productiveness of the hen. Green feed is a fowl's natural tonic, and has been described as nature's life-giver.

When one sees hens which have not laid an egg during the winter months brighten up in comb and begin to lay when spring returns with a natural supply of green feed, and geese gather their entire living, lay eggs, and rear young on a range well

supplied with green plants, it must be realized that a liberal supply of green material is necessary if the best results are to be obtained.

One-third of the entire ration for poultry should consist of green stuff. It is not sufficient to give quantity; quality is what is needed, and it should be fed in the way in which it will be most relished by the stock. Though the runs may contain grass, in too many cases this is so small or is so overstocked that the grass is more or less contaminated and is hardly fit for them to eat. In such cases fresh green feed should be supplied.

Of all the green plants I have used as poultry-feed, none equals lucerne. This for several reasons:—

(1.) Analyses prove it to be the most valuable.

(2.) When once established it will continue to grow for many years, and will produce heavier yields of green forage and hay than any of the clovers.

(3.) It furnishes much of the yellow in the yolk, and gives this the desired rich colour, and is most relished by the fowls; it is rich in nitrogen.

(4.) It will supply a liberal amount of green feed from early spring until April, and can be made into hay for winter use.

The lucerne should be chaffed fine, the finer the better; and it should be fed to the birds in troughs, as much being supplied as they will eat. The chaffed lucerne may be mixed with the mash. The hay may also be chaffed and fed to the birds dry—it is surprising how much of it they will eat in this state; but I prefer scalding it and allowing it to stand for at least twenty minutes, then mixing it with the mash. Last season as much as one-half of the mash for young growing stock consisted of chaffed green lucerne, and the birds never seemed to tire of it.

Undoubtedly the most important item of a chick's menu is green feed, and it should be freely supplied. We feed the brooder chicks largely on fine-cut lucerne; and I may here mention that last season (before green lucerne was obtainable) we had some trouble amongst the chicks with toe-picking—in fact, in several cases some of those attacked had a toe picked off by the rest—but once a liberal supply of green lucerne was supplied the trouble ceased.

In conclusion, I may add that no poultry-keeper can afford to be without a patch of this most valuable food; indeed, a regular, liberal supply of lucerne will do much towards keeping the birds in good health and the egg-basket full.

The following table shows the composition and nutritive ratio of a few green foods :—

Food.	Dry Matter, Percentage.	Digestible Nutriments.			Nutritive Ratio.
		Protein, Percentage.	Carbohydrates, Percentage.	Fat, Percentage.	
Lucerne	20·0	3·7	7·3	0·6	1 : 2·3
Lettuce	4·1	1·0	2·7	0·8	1 : 1·7
Cabbage	15·3	1·8	8·2	0·4	1 : 5·1
Rape	14·3	2·2	8·6	0·3	1 : 4·0
Oats	37·8	2·4	17·9	0·9	1 : 7·4
Red clover ..	29·2	2·9	14·8	0·7	1 : 5·8
Mangels	9·1	1·1	5·4	0·1	1 : 5·1

EXPORT OF EGGS TO VANCOUVER.

IN the early part of the year the Live-stock and Meat Division of the Department entered into negotiations with the Union Steamship Company of New Zealand (Limited) with the object of securing cool storage-space for the shipments of eggs from New Zealand to Vancouver. The company met the Department in a liberal manner by making special provision for a reasonably small apartment for conveying eggs under the most approved conditions. The arrangement has been made known to poultrymen throughout the Dominion through the *Journal of Agriculture* and the daily Press, but so far the provision made for shipping eggs is not anything like sufficient to occupy the special space provided by the shipping company.

Following is a copy of a letter received by the Live-stock and Meat Division of the Department from the Union Steamship Company on this question :—

Referring to your letter of the 7th March last and previous discussions with regard to eggs for Vancouver during the coming season: We have not so far received many definite inquiries for space. The only real inquiry is from Christchurch, as follows: August steamer, thirty-four cases; September steamer, fifty-one cases; October steamer, sixty-seven cases; November steamer, fifty-one cases; but the size of these lots is so very far short of filling one of the chambers that unless they can be supplemented by considerable shipments from other points we will be unable to accommodate them. The smallest-capacitied chamber that we can arrange for would be about 800 to 1,000 cubic feet, and to fill this we should require something like 270 to 300 cases. We understand that it is somewhat early in the season yet to arrive at anything definite, but we should be glad to know whether you have had any inquiries from country producers, from which some idea can be formed as to what quantities are likely to be sent forward.

From the above it will be seen that poultry societies and private producers will require to make arrangements to ship sufficient quantity to fill the space if the Vancouver market is to be tested on a proper scale during this season.

COOL-BROODING.

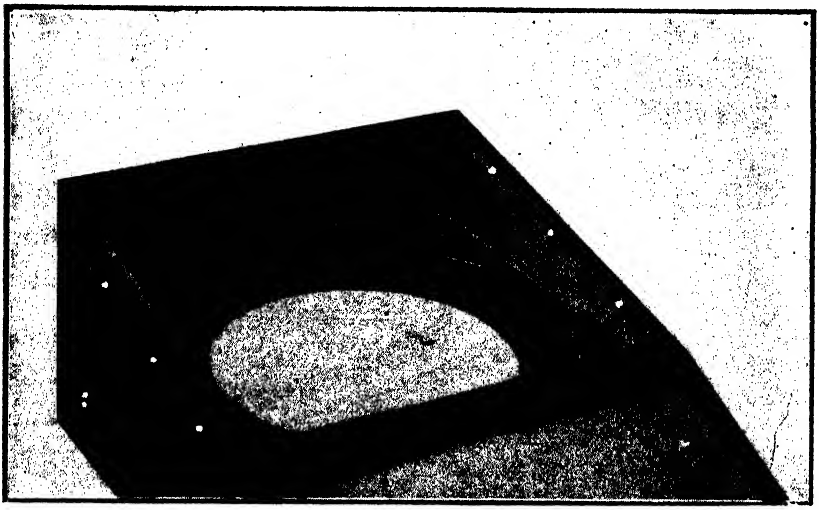
A. CARR.

Now that the breeding season has arrived a few practical suggestions in regard to rearing chicks without artificial heat may prove useful to those unsuccessful with this method during the past season and those intending to adopt it for the future. In the first place, it is essential that the brooder and everything connected with it should be thoroughly well made—to use a makeshift apparatus is only inviting failure. It should, before all things on the plant, be absolutely draught-proof, while the method of ventilation must be carefully arranged. A good size for a brooder to accommodate

THE COOL-BROODER AND RUN.

sixty chicks is 30 in. by 26 in., of a height of 16 in. in front and 12 in. at the back. This should be made of well-seasoned ⅞ in. T. and G. boards. The lid should project fully 2 in. on the four sides, and should be hinged at the back. On the bottom of the brooder runners (2 in. by 2 in.) should be placed, to allow free circulation of air, necessary if the floor is to be kept as dry as it should be. In the front and back walls panes of glass are most important. Light and sunshine are as necessary to the development of chickens as to that of all animal and plant life. The front pane should be at least 26 in. by 14 in., and the back pane 18 in. by 8 in. Needless to say, these should be well fitted in. All corners must be avoided if the chickens are to be saved from the disastrous

results attending overcrowding inside the brooder. The corners can easily be rounded by bending strong cardboard, and tacking this in place, thus making the interior of the brooder circular in shape. An old hat-box will provide the necessary cardboard. The best hover I have tried is circular in form, movable, and preferably constructed in metal. The legs may be extended by simply altering a few screws, so that the hover may be adjusted to suit the chickens as they increase in size. The hover should be covered with a piece of the best flannel blanket, and the curtain should consist of a double thickness of the same material slit up every 3 in. Ventilation, of prime importance for a cool brooder, is easily



Interior View of Cool-brooder.

Showing a metal adjustable circular hover in position, the bent cardboard to cut off the corners, the narrow strip across the back corners to provide for ventilation, the position of the holes at the bottom back corner (these holes being provided at the sides and back of each corner) for the ingress of air into the ventilating-flue, and the three holes on the top of the sides for egress of air.

provided. The air is let in by four bottom $\frac{3}{8}$ in. holes, two at each of the four back corners, the holes in each case being about $\frac{3}{4}$ in. from the corner and 1 in. from the bottom. To carry this air to a safe distance from the hover thin strips of wood 2 in. wide and 7 in. high are nailed across the back corners, thus forming a flue. The exits for the air are $\frac{3}{4}$ in. holes, three on each side wall, about 2 in. from the top. I have found dry sawdust (cabinet-maker's) the cheapest and best material for covering the floor. The covering should be 1 in. deep. Green sawdust must not, of course, be used. Dry sand or oaten straw chaff will also serve the purpose. On no account must chaff with grain in it—a common

cause of mortality—be used. A trap (4 in. by 4 in.), for affording entrance to the run, should be provided both back and front, so that the chickens may have a change of run or a run out in the best-protected position without the necessity of moving the brooder. The run need not be larger than 2 ft. 6 in. by 6 ft. and 10 in. high, the wire netting being ¾ in. mesh.

In using a circular hover it is of vital importance that nothing but pure all-wool blanket (New Zealand manufacture for preference) should be used for the top and for the curtains.

Before removing chickens from an incubator it is advisable to open the front of the machine by about ⅛ in. for about fifteen minutes so that the chickens may become accustomed to the outside temperature. It will avoid much work if the chickens be placed in the hover of the brooder at dusk. For the first day or two it is necessary to see that the chicks can always find their way back under the hover. It is easier to train them to do this if they have been removed to it, as advised, at night-time.

If the weather be suitable the chicks should be allowed into their run about the fourth or fifth day, commencing with half an hour on the first day (and, of course, at the most favourable time) and gradually extending the time till about the ninth day, when they should be well enough developed under fair conditions to be given unrestricted use of the run from between, say, 9 a.m. and 4 p.m. Allowing the early use of the run—emphasizing the fact that weather-conditions must always be studied—means that the chicks are made hardier from the start, while the bulk of the feeding and all the watering being thereby made possible in the run, the brooder is kept in a drier and more sanitary condition. It is well to have at hand a piece of ruberoid or oilskin the size of the run in the event of a sudden shower. A piece of string at each corner will enable this to be kept securely in position. On hot nights it is advisable to dab a pencil or piece of pointed wood into the blanket covering of the hover in about a dozen places. This will provide the extra ventilation needed under the circumstances (so keeping the chickens from sweating) without interfering with the warming-capacity of the blanket. On hot days it is well to take the hover and blankets out of the brooder and expose them to the influence of the sun for several hours.

The brooder should be thoroughly cleaned out twice a week. In fact, every effort should be made to keep the brooder and everything associated with it in an absolutely clean and sweet condition. Cleanliness has often been declared to be the foundation of successful poultry-keeping, and in no branch is it more important than in chicken-rearing.

THE FRUIT CROP.

THE officers of the Orchards, Gardens, and Apiaries Division report as follows on the condition of the fruit crop at the end of July :—

WHANGAREI.—The pruning of all classes of fruit is proceeding apace. Oranges, crop under average. Loquats, heavy crop.—*J. W. Collard.*

AUCKLAND NORTH.—Apples: Store supplies coming forward in fair quantities; prices good. Lemons looking well; prices good. Peaches blossoming in many cases, caused by mild winter. Pruning, spraying, and planting are being carried out energetically.—*W. C. Thompson.*

HAMILTON.—Pruning has been proceeding during the month, and growers have taken advantage of the fine weather to get their spraying well in hand. In the Bay of Plenty district the indications are for an early spring. The buds on some varieties of peaches and plums are swelling rapidly, and an occasional tree is to be observed in bloom. Lemon crops are looking exceedingly well.—*T. E. Rodda.*

POVERTY BAY.—The present has been one of the driest winters for many years, wells and creeks being as dry as they were in February. The rainfall for May, June, and July was only 4·97 in. Great difficulty is being experienced by the larger growers requiring a big quantity of water for spraying, and in some cases water is being carted some distance from the river for that purpose. Everything is very forward, some cherry-plums being in full bloom. In a few cases late peaches are coming out in flower, whilst Japanese plums and a few of the more forward apples and pears are also swelling their buds.—*W. R. L. Williams.*

MANAWATU AND WAIRARAPA.—Pruning and spraying are proceeding vigorously, red oil being mostly used for insect pests. Evidence of much more winter spraying being done this year; growers realize that it pays to spray. Trees are well forward—in fact, too well forward—showing quantities of blossom in some parts. Black aphis is making an early appearance in some districts. Every appearance of an early spring.—*George Stratford.*

WANGANUI.—Apples, apricots, and cherries looking well; and pruning and spraying in full swing. Lemons looking well. Nectarines, peaches: Trees healthy where attended to; in other cases much die-back and curl, and of late *Monilia frustigans* has become unpleasantly familiar. Pears and Japanese plums are doing very well. Cherry-plums have shown blossom for the last few weeks. Large quantities of tomato-seed are being sown.—*W. C. Hyde.*

HASTINGS.—Peaches and nectarines have in many cases suffered considerably through rust and die-back and the dry weather of last season. Other classes of fruit are looking well. Spraying and pruning are well advanced. There is every appearance of a very early season.—*J. A. Campbell.*

WELLINGTON.—Pruning operations are practically over, and spraying and cultivation are now in full swing. Pear and plum trees will need to be sprayed with Bordeaux mixture immediately, as the buds are swelling rather early. Early tomatoes for glasshouses are about ready for planting in some places.—*T. C. Webb.*

NELSON.—Apples: Shipments are getting smaller; on the whole they have kept very well this season. Trees seem to be showing very well for next season's crop. Apricots and cherries, good promise. Nectarines and peaches: With favourable weather a good crop of these can be looked for; the trees are budding up well. Pears looking well for next crop. Japanese plums are giving promise of a heavy crop. A good deal of pruning still remains to be done. Spraying with red oil is being pushed on with, and peaches, apricots, and Japanese plums are receiving their dressing with Bordeaux mixture. Fine weather has prevailed during the month, and an early spring may be expected.—*J. H. Thorp.*

BLENHEIM.—All fruit, excepting lemons, picked. Pruning and spraying are in full swing, but, as weather is keeping exceptionally fine, these operations will soon be finished.—*B. C. Goodwin.*

NORTH CANTERBURY AND WEST COAST.—Apples are still fairly plentiful. Apricots: Those in the local store are turning out very satisfactorily, good prices being obtained for them. Pears: Coming on the market there are some very fair samples of Winter Nelis and P. Barry which have been cool-stored. There is every indication of an early season. Buds on the stone-fruit are beginning to show colour in the sheltered places.—*W. J. Courtier.*

CHRISTCHURCH AND SUBURBS.—Apples: Pruning well in hand; oil-spraying for scale and spider commenced. If the weather hold, many varieties of soft fruits will soon be in bloom. Spraying for fungus diseases is being pushed on. Japanese plums are breaking bud, and in sheltered situations a few flowers are showing. The planting of tomatoes in hothouses is in progress.—*Gordon Esam.*

TIMARU.—Apples of nearly all varieties, apricots, and peaches generally are carrying a good show of fruit-spurs. There are promising indications of a good crop of cherries. There are good prospects for big crops of pears, most of all the varieties being well furnished with buds. Plums: Indications are for a good crop. The Japanese plums are showing evidences of an early spring; crop will be good, judging by the spurs. Tomatoes: Large quantities of seed are being sown under glass. Green aphis is attacking the young seedlings.—*A. B. Mansfield.*

DUNEDIN.—Apples: Small supplies are coming in regularly from Central Otago and the Taieri districts. The weather has been very mild during this month, and the buds are all well forward—perhaps too much so, if we were to get severe frosts later, which is quite probable. Pruning operations are well in hand, and many growers have their winter spraying done. All fruit-trees are well supplied with fruit-buds, but it is too early yet to predict crops. Prices for all fruit have averaged well this past season, and growers generally have had a most satisfactory year. An effort is being made to try to get a small consignment of apples together for the export trade next season.—*W. T. Goodwin.*

MARKET CONDITION OF LOCAL FRUIT AND VEGETABLES.

THE Fruit Inspectors of the Orchards, Gardens, and Apiaries Division report as follows on the condition of locally grown fruit and vegetables in the shops and auction-rooms, and the market position of these, for the month of July:—

AUCKLAND.—The supplies now arriving at the Auckland auction-marts show a considerable reduction on previous figures, consequently, as the demand has been fairly brisk throughout the month, prices realized have been highly satisfactory both to growers and to auctioneers. The prices for the month are as follows: Choice dessert apples rose from 7s. 6d. in the earlier part of the month to 10s. 6d. per case; other grades in proportion. Pears, ex cool store, 8s. to 12s. per case. Returns from lemons have had a tendency to fall towards the end of the month, but good prices are still ruling: choice fruits, 10s. to 14s. per case; seconds, 5s. to 7s. 6d. Tree tomatoes, 4s. 6d. to 6s. per 18 lb. case; house tomatoes, 5d. to 8d. per pound. Passions, 4s. to 6s. per 18 lb. case, according to quality.—*C. Craigie.*

WELLINGTON.—Supplies of fruit on the local markets during this month have been very fair, and satisfactory prices are ruling. The sample forward is poor, and the grading and packing is anything but good. The prices ruling are: Dessert apples, 8s. to 10s. per bushel case; others, 5s. 6d. to 6s. 6d.; cooking apples, 5s. to 7s. Dessert pears, 7s. 6d. to 9s. 6d. per case; cooking, 6s. 6d. Vegetables are in good demand and prices are good. Table potatoes, £4 5s. to £5 per ton; seed potatoes are in good demand—Kidneys, £8 10s.; Up-to-date, £5 10s.; Northern Star, £5 10s.; Early Rose, £8 10s.; Gamekeeper, £6, per ton. The market for onions remains firm at £10 per ton.—*T. C. Webb, jun.*

CHRISTCHURCH.—Apples: Fair quantity coming forward. Dessert, 7s. 6d. to 8s. 6d.; cookers, 6s. 6d. to 7s. 6d., per case. Pears: Very few good late, 8s. to 9s. per case. Passions: 8s. to 9s. Potatoes: £2 10s. in paddock; very poor demand. Onions, £7 10s.—*G. Esam.*

DUNEDIN.—Apples, fair supply. Pears, short supply. Potatoes plentiful. Cauliflowers, cabbages, and swedes, short supply. The prices ruling are as follows: Eating-apples, 2½d. per pound; cookers, 1½d. to 2d. per pound. Pears, 2d. to 2½d. per pound. Potatoes, £4 per ton. Swedes, 1s. 6d. to 2s. per sack. Cauliflowers, 4s. to 5s. per sack. Cabbages, 2s. to 2s. 6d. per sack. Shops are well stocked.—*E. T. Taylor.*

BLUFF.—New-Zealand-grown fruits are now scarce on this market, the only available fruits being apples and pears and Auckland Poor-man oranges. The prices ruling for the month are as follows: Apples—dessert, 8s. 6d. to 10s. per case; cooking, 6s. 6d. to 8s. 6d. Pears, 7s. 6d. to 8s. 6d. per case. Poor-man oranges, 6s. per case. Passions, 10s. 6d. per case. Potatoes, £3 5s. to £3 15s. per ton. Potatoes, on trucks at country sidings, £2 15s. per ton. Onions, 10s. to 11s. per cwt. Cabbages, 3s. per sack. Parsnips, 4s. to 5s. per cwt. Carrots, 3s. 6d. to 5s. per cwt. Swedes, 1s. 6d. to 1s. 9d. per sack. Marrows, 6s. per cwt.—*R. Hutton.*

HONEY-CROP PROSPECTS.

THE Director of Orchards, Gardens, and Apiaries Division has received the following reports on the honey-crop prospects from the Apiary Instructors:—

AUCKLAND.—The situation is much the same as mentioned in my last report, satisfactory prices still ruling for both honey and beeswax. Many beekeepers are now more hopeful of the future prospects of the industry in New Zealand, owing to the lessening of foul-brood and the prospects of an export trade being opened up, and they are contemplating increasing their apiaries during the coming spring.—*G. V. Westbrooke.*

WELLINGTON.—The recent shipments of honey to England have been instrumental in keeping local prices on a firm basis. The prices given in the June issue of the *Journal* still hold good.—*F. A. Jacobsen.*

CHRISTCHURCH.—Honey is not quite so plentiful, and prices are firm. Bulk honey in many instances has advanced ½d. per pound. Sections are in demand, but are getting scarce, selling retail at 6d. and 7d. Honey cut up into pats is bringing 6d. per pound retail. The recent mild weather has caused vegetation to burst in bud, more particularly in North Canterbury. Beekeepers should take the opportunity to examine their colonies and see that there are ample stores. Another shipment of graded honey has been made to England during the month of July.—*L. Bowman.*

DUNEDIN.—There is little fresh to report. A few lines of honey are still offering. Sections are scarce and in strong demand. Good lines of pat honey are forward. Beeswax is scarce, the supply not being equal to the demand.—*E. A. Earp.*

Co-operative field experiments were conducted on 586 farms in the Dominion last season, while 440 farmers, provided with free seed, lime, and inoculated soil, tested lucerne on their holdings.

During the month of July 788 farmers visited the Ruakura Farm of Instruction, 90 farmers visited the Moumahaki Experimental Farm, and 70 farmers visited the Waerenga Experimental Farm.

Owing to the large number of new subscribers registered in July—824—the supply of *Journals* of that month's issue has been exhausted. Under the circumstances new subscribers can only be booked from this number of the *Journal*.

THE WEATHER FOR JULY.

D. C. BATES.

OWING to the predominance of moderate westerly winds the east coast districts between East Cape and Oamaru were favoured with exceptionally fair weather and a rainfall considerably below the average. The vicinity of Cook Strait also returned a remarkably low rainfall, and, beside, experienced very fair and mild conditions, which were most favourable to early vegetable-growth. The Wanganui district was the only portion of the North Island where an excess of the normal rainfall occurred, but in the South Island the whole of the west coast and southern districts suffered in this respect and were subject to unsettled weather.

There were no serious atmospheric disturbances during the month, the westerly low-pressure area ruling between the 19th and 23rd having the most effect on weather-conditions. At this time many parts of the country recorded moderately heavy rains.

DISTRICT NOTES.

District. *Chiefly from Telegraphic Reports.*

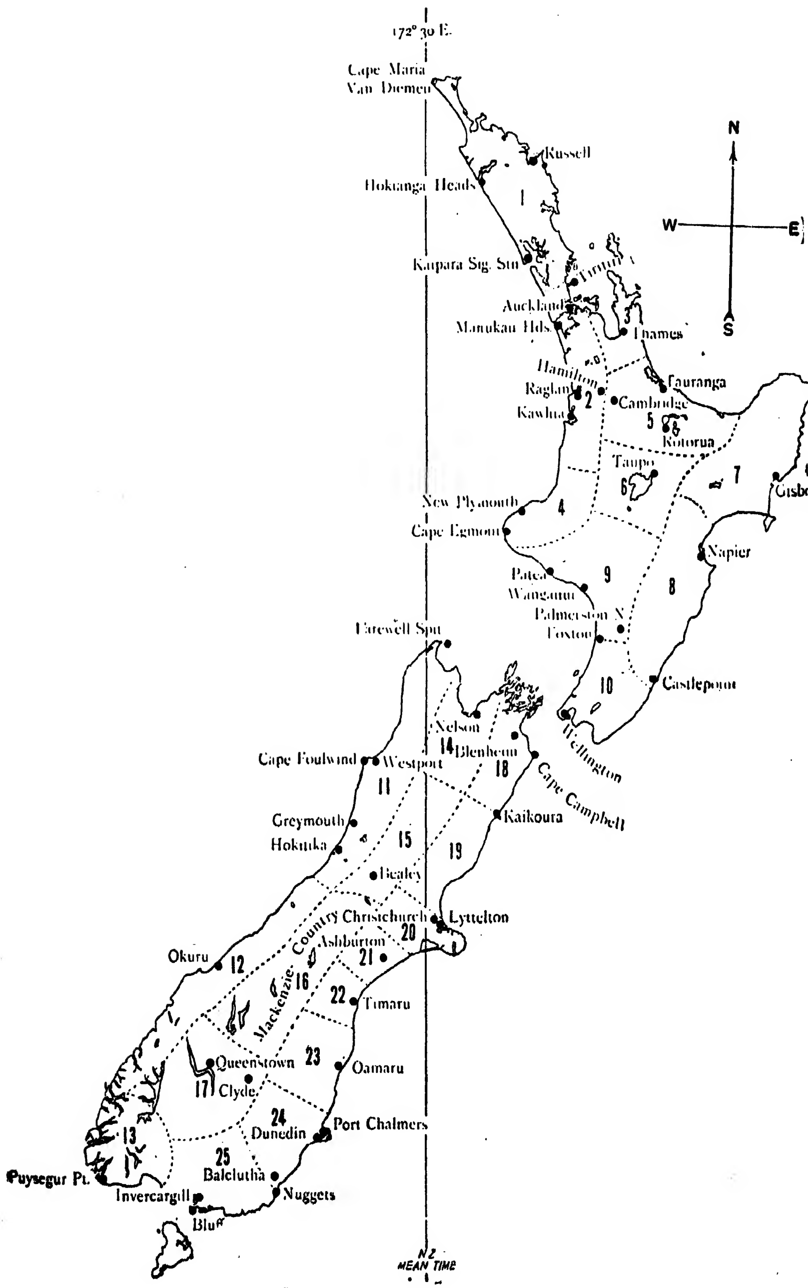
1, 2, 3. Westerly winds predominated, with cold and showery weather, the number of wet days being in excess of the average. The total fall, however, was slightly below. Stormy conditions were experienced on the 20th and the two succeeding days.

4. The rainfall was about 20 per cent. lower than the mean for July, the greater portion falling as showers. Heavy rain fell on the 19th and 20th. Very cold bleak weather prevailed, and some hard frosts occurred, the one on the 12th being the most severe during the month.

5, 6. Cold weather, with frequent showers, predominated, but several short periods of fine weather intervened. In district No. 6 snow fell on the high levels on the 11th and 12th, and again on the 21st and 24th, and some frosts were also recorded. The month's precipitation was below the normal, most places returning about a 20-per-cent. deficiency.

7, 8. Both these districts experienced one of the driest Julys on record; in numerous instances the aggregate total rainfall was little over an inch, about one-fourth of the average. The only day with remarkable rain was the 19th, when slightly over half an inch was generally recorded. Fair to cloudy weather prevailed, but at times keen, dry winds were experienced, and the usual winter frosts were of frequent occurrence.

9. Precipitation exceeded the average slightly in almost all parts of the district, the only district in the North Island returning a general excess. Some heavy rain fell on the 19th, 20th, and 21st, and the weather preceding was extremely showery, with cold westerly winds. From the 22nd to the 30th fair conditions ruled, although strong but dry westerly winds were experienced at times during this period. Wet weather set in again on the 31st.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Rotorua
Taupo
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Gisborne
New Plymouth
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Napier
Patea
Wanganui
Palmerston N.
Foxton
Castlepoint
Wellington
Farewell Spit
Nelson
Blenheim
Cape Foulwind
Westport
Cape Campbell
Kaikoura
Greymouth
Hokitika
Bealey
Christchurch
Lyttelton
Ashburton
Mackenzie Country
Timaru
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District.

10. There was a considerable deficiency of rain over this district, the percentage below normal averaging about 50. Most of the rain fell on the 2nd, 9th, and 21st, and frequent light showers were recorded during the first half of the month. As a rule, however, the weather was of a mild and fair character for July, and was not marked by much wind. The mildness of the weather was instanced by the remarkably early growth of vegetation, the flowering of bulbs, and the blossoming of the fruit-trees, &c.

11. In the northernmost portion of this district the total month's rainfall was slightly less than the average, but elsewhere an excess was recorded which ranged from 10 to as much as 50 per cent. With the exception of a few days the month was one of unsettled weather, although the wind-force was not excessive. A westerly gale prevailed on the 2nd, on which date some extremely heavy rain fell. Snow fell on the high country on the 10th and 24th.

12, 13. Precipitation was considerably above the average in all parts of these districts, Okuru, with 21·96 in., having nearly double. Similar weather to No. 11.

15. Heavy rain fell on the 1st and 2nd, again on the 19th and 20th, and much showery weather was experienced during the month. Snow also fell on several days. The total precipitation was above the average everywhere, but the excess was not so much on the eastern slopes as to the westward, where it was about 40 per cent. Several short periods of fair weather prevailed.

16. Fair and mild weather predominated, and the rainfall was generally below the average, the deficiency ranging from 15 to 60 per cent.

17. About the average rainfall or a slight excess was returned. Fair but cloudy weather ruled, and frosts occurred on numerous occasions.

18, 19. Over both these districts there was a considerable deficiency of precipitation, averaging about 55 per cent. Fine bright days, with cold frosty nights, were the rule. On the morning of the 12th a very severe frost was recorded.

20, 21, 22. Except at a few stations along the coast, where the average was slightly exceeded, the rainfall was usually somewhat below. Weather similar to Nos. 18 and 19.

23. Forty per cent. above the average rainfall was recorded, the heaviest rain occurring on the 2nd, 10th, and 21st. Westerly gales prevailed on the 26th and 28th. The weather was very favourable for July, with sunshine and showers alternating.

24, 25. Cold and damp weather was the predominating feature of the month, the rainfall being everywhere considerably above the average. That portion of district No. 25 bordering Foveaux Strait, and also Stewart Island, were especially subject to stormy conditions.

POISONOUS POTATOES.

POTATOES which have been grown on or very near the surface of the ground, or are subsequently allowed to remain exposed to daylight for a long period, may develop poisonous qualities. A case is under investigation in which members of a family always felt ill after eating certain potatoes. These, on examination, were found to be green under the skin, but this was not evident until they had been pee'ed. It will be safer for housewives, therefore, to reject as unfit for culinary purpcses potatoes showing this peculiarity. They would, of course, be excellent for seed purposes, other things being equal.—*B. C. Aston.*

It is worthy of note that the variety of cabbage known as "Garden Drumhead" is standing the winter well, being quite unimpaired by continued frost and frequent rain.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtained from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith.

SILVER-BEET.

A number of inquiries in regard to where seed of the varieties of silver-beet recommended by the Department may be secured have been received. All the information the Department has on the subject may be found on page 167.

POTATOES.

R. P. S., New Brighton:

Could you give me any information on the Dasheen, of the potato variety, which was sent to a farmer in the States by the Department of Agriculture, Washington, and was prized as being something "extra good," according to one report I have seen. Is it suited to New Zealand?

Have your experimental farms any knowledge of the Warrior potato's results, and grounds most suited?

The Fields and Experimental Farms Division:—

A supply of Dasheen tubers, obtained from the United States of America, are at present being tried at the Tauranga Experimental Farm. It is too early yet to say whether the experiment will be a success. The following information may be of some use to you in regard to the culture of the Dasheen:—

"The Dasheen requires rich sandy soil, very moist, but well drained. The plants will not be greatly injured by occasional flooding of the land for a short period. Such lands as the so-called hammock lands of Florida are especially adapted for the cultivation of this crop. Any low-lying, sandy flats, fairly well drained, but still too wet for general field crops, can be used to advantage. On these low lands it would be advisable to plant on ridges. For best results a liberal amount of well-rotted stable manure should be mixed with the soil. Where the soil is very sandy it is well to add a fertilizer rich in potash. Planting should be done as early in the spring as conditions of soil and climate will permit. This may be as early as the 1st February in South Florida, and as late as the middle of March or the 1st April in the Carolinas. For field culture the tubers are planted, singly and entire, from 2 in. to 3 in. deep in hills at a distance of 3 ft., in rows 4 ft. apart. This will permit horse cultivation. During the summer, in cultivation, the soil should be gradually drawn to the plants, and the plants kept free from weeds; they usually require little cultivation after becoming large enough to shade the ground. Well-grown plants will reach a height of 4½ ft. to 6 ft. or more in mid-summer. The crop matures in about seven months, although the tubers can be utilized for home use in six months or less from planting. Harvesting of the main crop may be deferred a month or two if desired, but if it is to be done at one time, in order to have warm dry weather for the Dasheens to dry properly on the ground, it should not be delayed till danger of frost. Maturity of the crop is usually indicated by a partial dying-back of the plants some time in October. It will sometimes prove advantageous, in practically frost-free localities or where roots can be protected, to leave them in the ground until wanted for use, or until spring. A 10 in. plough has proved satisfactory for turning up the plants when the area

grown is large enough to justify its use. The plants are then grasped by the tops, and the clumps thoroughly shaken to dislodge as much of the soil as possible. They can then be broken apart by means of the tops, and in dry weather the tubers, with tops still attached, be left on the ground to dry for four or six days. The tubers should not in any case be exposed to the frost. Dasheens should be stored in a dry place of moderate temperature, where the air can circulate freely among them, or they may be placed in dry sand or earth."

The Warrior potato was grown at the Weraroa and Tauranga Experimental Farms and at Ruakura. At Weraroa the result was poor, although the potatoes were free from blight. The potato did very poorly at Tauranga. Ruakura reports as follows: "Warrior is a main crop (kidney) potato of good quality, and is a fair cropper. It resembles Up-to-date. The result of last year's crop at this station was 9 tons large and 1·43 small. Any medium loam would be suitable."

TREE-PLANTING.

MR. W. G. MIDFORD, Tahuna, Morrinsville :—

What kinds of trees would it be advisable for one to plant for shelter, timber for fencing, or firewood, and how many years would elapse before the timber would be useful for fencing? A good deal of my property is hilly gum land, and if I decide to go in for planting for future use, will the Government give me any assistance for so doing? An early reply will be thankfully received.

The Orchards, Gardens, and Apiaries Division :—

The black-wattle (*Acacia decurrens*) is a very suitable tree for planting for shelter in your district. In from seven to ten years' time the timber is useful for fencing posts and rails and also for firewood. The plants are best raised from seed, which should be sown in prepared ground where the trees are to remain permanently, as the wattle is very difficult to transplant successfully unless great care be taken in the operation. Before sowing, the seed should be steeped in boiling water for eight to twelve hours to assist germination.

Other suitable trees are—*Pinus austriaca* (Austrian pine): Splendid shelter-tree; durable timber for posts and sleepers. *Pinus Laricio* (Corsican pine): Fast-growing; good timber-tree. *Pinus radiata* (*P. insignis*): Good shelter-tree; timber very suitable for fruit-cases.

The Government assists settlers by giving advice as to what varieties are most suited to certain districts, distance apart to plant, &c.

FILLY WITH SWELLING BETWEEN TWO FRONT LEGS.

"RAWIRIRI," Darfield, Canterbury :—

I have a filly eighteen months old by a thoroughbred horse and common draught mare. It is very well grown; but about six months ago it developed a swelling right between the two front legs (on the brisket, so to speak) without any cause as far as we know. It is soft, and appears as though it was full of water. Would you be kind enough to advise me what to do through the *Journal of Agriculture*?

The Live-stock and Meat Division :—

The "swelling" is evidently a serous cyst. This is a cavity containing an effusion of the watery parts of the blood, and is due generally to continuous pressure, in this case between the breast-bone and the ground. Treatment would consist in opening the cyst and injecting some agent, such as iodine, to destroy the cyst-wall. If this be not done they may fill up again. Ascertain when a qualified veterinary surgeon is likely to be in your district, and get him to operate.

BRITTLE HOOFS.

"INQUIRER," Scott's Gap :—

Would you kindly inform me through the medium of your *Journal* of the best method of softening a horse's hoofs when they are very brittle.

Also, when a stallion is down in the soles, should the growth be cut out or left alone?

The Live-stock and Meat Division :—

Brittle feet are usually a congenital defect due to breeding from parents or parent having the condition. It is also seen after an attack of laminitis or so-called "founder." In this case the sensitive laminæ which secrete the horn are inflamed and damaged to such an extent that the horn they afterwards secrete is altered and brittle. What you want to do is to toughen the horn, and not soften it. Rub the wall every other day with lanoline, and apply mild cantharides blisters round the coronet every now and then.

If the horse's soles are down you can do little good. The "growth," as you term it, is not a growth at all, but simply a bulging of the sole due to the descent of the pedal-bone.

SWEDE TURNIPS.

"INQUIRER," Dannevirke :—

Will you kindly inform me whether swede turnips, being fed to pigs, are more nourishing cooked or raw ?

The Live-stock and Meat Division :—

Probably cooked, for pigs that are fattening. Swedes contain a very large percentage of water, and raising this to the body-heat before digestion and assimilation can take place entails a loss upon the economy. By cooking this loss is done away with, although it means a certain amount of expense. It is not necessary to cook the roots for store pigs or in-pig sows, although the latter should not be fed with them in large quantities when near pigging.

CONGEALED MILK.

MR. JAMES BOURKE, Ruahine, Mangaweka :—

Would you kindly inform me through your next issue of the *Journal* how to treat a number of my cows. In drying off, I find some of them have congealed milk in their teats: do you think it will injure them for next season ; and, if so, what would you advise ?

The Live-stock and Meat Division :—

The "congealed" matter should be milked out. Afterwards inject about half a cupful of a lukewarm 4-per-cent. solution of boracic acid into each quarter, and leave it in.

SANDY LOOSE SOIL.

"SUBSCRIBER," Oamaru :—

Kindly answer through your next *Journal* as to what would be the best to plant in a small piece of ground—potatoes, peas, or vegetable-marrows ? Also what manure, with the vegetable you recommend, will enable me to obtain good results from sandy loose soil ?

The Director of Fields and Experimental Farms Division replies,—

Potatoes, carrots, parsnips, turnips, and peas should do well in the soil described. *Re* suitable manure for potatoes: It is difficult to lay down general rules for the manuring of this plant, so varied are the tilths upon which it is grown. Appended is the scheme of fertilizers for potatoes designed by the Agricultural Chemist, which has been carried out by the Department during the past year. This could be tried by the inquirer. In carrots and parsnips, the soil for growing these should be deep sandy loam rather abundantly supplied with potash and nitrogen. Peas also would do well in favourable seasons. Suitable mixtures of fertilizers for these can be obtained from most of the firms supplying fertilizers. Potatoes: Plot 1, 2 cwt. superphosphate, 1½ cwt. bonedust; plot 2, 2 cwt. superphosphate, 1½ cwt. bonedust, 1½ cwt. dried blood; plot 3, 2 cwt. superphosphate, 1½ cwt. bonedust, 1½ cwt. dried blood, 1 cwt. sulphate of potash; plot 4, no manure; plot 5, 2 cwt. superphosphate, 1½ cwt. bonedust, ¾ cwt. sulphate of ammonia, 1 cwt. sulphate of potash; plot 6, 4 cwt. superphosphate.

SILVER-BEET.

MR. H. S. STEVENS, Awarua Plains, Southland :—

Would you kindly inform me through the *Journal* if silver-beet is suitable for feeding off to cattle; or do they destroy the crown, and thus prevent it from making a second growth? Is it advisable to feed it to dairy cows? What would be the best variety to sow in Southland?

The Director of Fields and Experimental Farms Division replies,—

Cattle have been fed on silver-beet, and it is stated it has not tainted the milk, but the beet was cut and fed to them in another paddock. No doubt it could be fed off by cattle, but the danger would be of their eating too deep into the crown and preventing it making a good second growth. Stock must not be left on silver-beet too long. Where cattle feed on it they should have just a break sufficient for them to eat off in a day. The best variety to sow, so far as the Department's experiments have gone, is the Swiss Chard silver-beet—plain dark-green leaf, with broad stem and thick midrib.

TRICALCIC PHOSPHATE.

MR. H. PARKER, Manawaru, Te Aroha :—

Will you please explain the meaning of the term "tricalcic phosphate"? I meet with the term in books on agriculture and manure catalogues, but do not understand its meaning.

The Agricultural Chemist replies,—

"Tricalcic phosphate" is a convenient way of referring to the phosphate which is found in bonedust, guano, and other phosphatic fertilizers. Tricalcic phosphate contains 54·2 per cent. of lime and 45·8 per cent. of anhydrous (dry) phosphoric acid. A more popular term is "phosphate of lime," but as this embraces several kinds of phosphate differing in value the term is ambiguous, and its use is therefore misleading.

SAND-BINDING GRASSES.

MR. C. E. SPARKES, Lough Spit, Hokitika :—

Could you inform me which is the most suitable grass-seed to sow on raw beach sand; also, could you advise where I could obtain seed?

The Director of Fields and Experimental Farms Division replies,—

If sand is liable to heavy drifting, marram-grass or sea lyme-grass would be the most suitable. In ordinary sandy waste, lucerne has been found to give good results. *Poa pratensis* is also very suitable. It is a good plan to sow these with annual lupin, as, if not successful, the lupin can be ploughed in as green manure to make humus and provide the necessary plant-food. It also affords shelter to the young grass. All the seeds above-mentioned can be procured from any firm of seedsmen.

MANURE.—SHELTER-TREES.

H. L., Burnside, Kaitieke :—

1. What artificial manures, and what quantity per tree, would be necessary in planting an orchard in this district? The soil consists of about 4 in. of black loam on pumice, and it is not possible to get stable manure.

2. What shelter-trees would you consider suitable for this class of country?

3. In making a flower-garden, would you advise manuring rose-trees; and what manure?

The Orchards, Gardens, and Apiaries Division replies,—

1. A very suitable artificial manure for young fruit-trees is bonedust and superphosphate, mixed together in the proportion of two-thirds bonedust and one-third superphosphate. A couple of handfuls of this mixture should be thrown round the sides of the holes when planting the trees.

2. The following trees should prove suitable for shelter in your district: Blackwattle (*Acacia decurrens*)—best grown from seed, which should be sown in places where trees are to remain permanently. *Pinus muricata* is a splendid sheltertree of dense growth. *Pinus austriaca* is close-growing and has heavy foliage.

3. The mixture recommended above would be very suitable for manuring rose-trees, applied at the rate of a handful or two round each plant.

HORSE SUFFERING FROM CORNS.

"AGRICOLA," Sunnybrook:—

What treatment would you recommend one to try on a horse that suffers badly from corns?

The Live-stock and Meat Division:—

Corns are generally due to faulty shoeing, especially in feet where the heels are weak and soles flat. You do not say whether the "corns" are suppurating or not; if they are, they are very troublesome and will require treatment by a veterinary surgeon. Probably the best treatment is to remove the shoes and give the horse a run out for a couple of months, then have him shod by a good smith.

FEEDING SWEDES TO COWS.

"A SUBSCRIBER":—

Has any means been found of feeding swedes to dairy cows without tainting the milk?

The Director of Fields and Experimental Farms Division:—

Swede turnips can be fed to dairy cows without affecting the flavour of the milk to any great extent. Cows should not be allowed to have a free run over turnips. Feeding turnips, with hay, straw, or chaff, should be done immediately after milking. If only a few cows are being fed, use pulped turnips with chaff and bran, and, if possible, feed them away from the byre. This would allow from ten to twelve hours before milking, and it is not thought that any objection could be taken to the sale or use of milk under these conditions.

HORSE-BREEDING.

R. H. W., Lichfield, Waikato:

Can you give me the names and prices of the best books on horse-breeding?

The Live-stock and Meat Division:—

We do not know of any book treating on general horse-breeding, which is presumably what you require, and do not think any such work is published. Chapters on breeding, however, are included in the most important works dealing with agriculture. Works on breeding the thoroughbred horse have been written by W. Allison and Bruce-Low, the latter work dealing with the so-called "figure system." The breeding of the trotting-horse has, we think, been treated by American writers, but by whom we cannot say. Probably inquiry of such booksellers as Whitcombe and Tombs, Wellington, or Chamtaloup and Cooper, Auckland, would give you information. So far as we know there is no work dealing with the breeding either of heavy horses or of hackneys.

MILLET AND MAIZE.

MR. T. A. KEMP, Mauku:—

Could you tell me the best time to plant millet and maize for green feed?

The Fields and Experimental Farms Division:—

These plants are receptive to even slight frosts. The seed requires warmth of soil to ensure free germination. A trial sowing to provide early feed could be made towards the end of October, and the main crop may be planted towards the end of November, or even in December.

SHELTER-TREES.

MR. W. F. MEYENBERG, Tairua :—

Could you tell me what are the best kinds of shelter-trees to plant in this part of the country (clayey gum land) ?

The Director of Orchards, Gardens, and Apiaries Division replies,—

Any of the following varieties of trees should be very suitable for shelter-planting in your district: Black-wattle (*Acacia decurrens*), *Pinus muricata*, *Pinus austriaca*, and *Eucalyptus amygdalina*. Black-wattle is best grown from seed, which should be sown in the places where the trees are to remain permanently, as the wattle is very difficult to transplant unless great care is taken in the operation.

LUCERNE.

CAPTAIN W. J. NEWTON, Balfour Road, Parnell, Auckland :—

On the 1st May, in ground well manured with poultry-droppings, I sowed in drills some Hunter River lucerne-seed. On the 7th the lucerne showed above the ground, looking very well. At this time I received some soil from Dempsey Island, in the Hunter River, New South Wales. From a letter accompanying the soil I give a few sentences, viz.: " I trust you will get your lucerne to start; but I am afraid you have clay soil, and lucerne up here will grow in any soil but that. It will grow in sand, but as soon as it touches clay it goes right off. If your soil is clay you can give it up." I planted the seed in May on advice from Hawksbury College, N.S.W., saying they planted from April onwards. What is you version of lucerne and clay soils ? I am a subscriber to your *Journal*, and have read all that you have published since last year, but have not noticed anything bearing on this point. I should have mentioned that on receipt of Hunter River soil I spread it over the ground and raked it in.

The Director of Fields and Experimental Farms Division replies,—

In most parts of New Zealand, save a few localities, spring-sown crops of lucerne are more satisfactory than others. A true clay subsoil, especially with only a shallow top-soil upon it, would be a doubtful proposition for lucerne, and would require very special preparation in the way of liming and draining to enable a plant to be established thereon. Many soils, especially subsoils, in New Zealand are spoken of as " clay " because they are close in texture. Some of these have very little clay in their composition. Lucerne has been established on soils having a true clay subsoil, but it is expensive work, and the life of such plants will probably not come up to the average, especially in districts having a heavy winter rainfall.

WORKING FERN AND TEA-TREE COUNTRY.

" NEW CHUM," Huntly :—

I have a block of fern and tea-tree country near Huntly, and would be glad to have your advice as to how to work it. I am going to plough 100 acres this winter, and to put in turnips about Christmas-time. I would like to know what you consider the best crop for feeding off, to enable me to feed off in the following spring and summer, and then sow in permanent grass the next autumn. This would give the land three ploughings, which should be sufficient to kill out the fern. I should also like your advice on what crops to sow for autumn and winter feeding.

The Director of Fields and Experimental Farms Division replies,—

Presume crop to be sown at Christmas would be swede turnips. It would therefore be well towards end of winter before these were out of the ground, probably. It is almost impossible to recommend any crop without knowing something about the land, and you give absolutely no information. Rape, Thousand-headed kale, or Buda kale might suit your purpose, and would perhaps be the easiest crop to deal with. The swedes would also be out of the ground in time for the spring sowing of oats, but one of the former crops would most probably suit your purpose best, and you could sow down afterwards with a light cover-crop of oats. The chief crops sown for autumn and winter feed are early-autumn-sown

crops of oats, barley, ryecorn, and tares. Late-sown catch-crops of white turnip sometimes, if weather is favourable for a good strike, come in very useful. Italian rye-grass, western wolths, or a mixture of Italian rye and prairie are suitable to some districts. Swede turnips and mangels are, of course, among the best of winter feeds, but are not suitable for autumn sowing.

LUCERNE.

MR. G. D. MACFARLANE, Woodville :—

In the *Journal of Agriculture* for June I notice that you are considering repetition of the offer of last year in regard to lucerne. Should you decide to do so, you might let me have particulars *re* terms, &c.

With regard to co-operative experiments, you might please forward conditions of same. During the coming season we may be in a position to go in for something of that nature.

The Fields and Experimental Farms Division :—

No decision has yet been arrived at in connection with repeating the offer last season to supply experimenters with sufficient seed, soil, and lime to cultivate an acre of lucerne.

I am asking Mr. Baylis, this Department's North Island Fields Instructor, to communicate with you in regard to co-operative experiments.

HEIFER WITH FIRST CALF; SHELTER-TREES.

"SUBSCRIBER," Pleasant Point :—

1. How long should a heifer be milked with the first calf? 2. What kind of shelter-trees thrive best on shingly land?

The Live-stock and Meat Division :—

1. The milking-period should be extended as long as possible.

The Orchards, Gardens, and Apiaries Division :—

2. The following varieties of trees should prove very suitable for shelter-planting on your land: Black-wattle (*Acacia decurrens*)—A quick grower, and best raised from the seed, which should be sown in the places where the trees are to remain permanently, as the wattle is rather difficult to transplant successfully. *Pinus muricata*—A dense-growing tree, and one of the best for shelter. *Pinus insignis*—Good shelter-tree, and quick grower.

BONE-SPAVIN.

"SUBSCRIBER," Bromley :—

Could you inform me through the *Journal* if there is any cure for a horse that has spavins badly? It does not interfere with his work, but spoils the look of him.

What is a sure cure for thrush in the frog of a horse's hoof?

The Live-stock and Meat Division :—

We presume by "spavin" you mean bone-spavin. If so, there is no cure—once a spavin, always a spavin. Let him alone, as he is not going lame.

There is no "sure cure" for thrush or anything else. What is successful in one case may not be so in another. Thrush is an inflamed condition of the membrane which secretes the horn of the frog, and the two great causes are dirt and moisture, and want of pressure on the frog, the latter being seen in horses with contracted heels. Here the horn of the frog is very hard and dry, matter being in the cleft. Where thrush is due to dirt and filth—bad management—the frog is usually soft and flabby. Remove with a blacksmith's knife all loose portions of horn, and thoroughly cleanse the foot, and keep as dry as possible afterwards. Apply to the parts every day a powder composed of equal parts of calomel and oxide of zinc, working it well into the cleft.

TARES.

G. D. M., Waikouaiti :—

Would you kindly let me know the proper time to cut tares to stock for winter feed? I sowed oats and tares last spring, and cut them when the flower had just about died, and stacked after the crop had been cut a week. I considered it quite fit to stack at the time. I am feeding it now to the cows, and the tares are losing a lot of the leaf, which I think is too good to lose.

The Fields and Experimental Farms Division :—

The proper time to cut tares is three or four days before the plant is in full bloom. Great care should be exercised in curing it before stacking, for, should it be exposed too long to the drying influence of the sun and winds, leaves will drop off when afterwards handling it. This was, no doubt, the cause of the loss of leaves when feeding it afterwards to cows as stated.

EMERALD RYE.—LUCERNE.

"AGRICOLA," Sunnybrook :—

Kindly tell me whether the accompanying sample of rye is the true rye corn or emerald rye. Some people think it is only the ordinary rye. Is emerald rye at par with rape for fattening stock?

What price per hundredweight does the Government charge for inoculated soil for the purpose of growing lucerne? And what price per pound is Hunter's seed, and where would one order it from?

Do you think lucerne would be successful on stony land with a good open subsoil, and about 20 ft. above a river?

The Fields and Experimental Farms Division :—

It is difficult to tell emerald rye seed from ordinary rye-seed, and one has to rely on the word of the seller. From an examination of the sample I should think the seed was ordinary rye. Emerald rye is said to be superior to the ordinary kind, and on good soil certainly produces very fine crops, but I should rank rape as better for feeding. Rye is, however, often a success in seasons when the rape is a comparative failure.

The Department supplies inoculated soil for lucerne at 2s. per hundredweight, f.o.r. Hunter River lucerne-seed may be obtained from any seed-merchant at a cost of about 1s. 9d. per pound.

The particulars given by you in regard to the nature of your soil are too meagre to give an opinion as to whether lucerne would be successful or not, but the seeding should be increased if the land be very stony, as much of it will be covered by the stones.

LUCERNE.

MR. E. J. DOAK, Takahue :—

Can you kindly inform me what depth of soil I can take from lucerne twelve months old for the purpose of inoculation? To use the subsoil as far down as the roots have pierced, would it be effective if applied to new ground for sowing lucerne?

The Fields and Experimental Farms Division :—

Inoculating soil from a twelve-months-old plot is effective to a depth of 9 in., provided the stand be a good one. Experiments to determine this have already been carried out at the Ruakura Farm of Instruction.

FEEDING CALVES.

MR. F. C. YEOMAN, "Lynton," Opouriao :—

I am much interested in the article in the May number on linseed, by T. W. Lonsdale. I know from experience what a valuable substitute it is in rearing calves. I purchase the crushed linseed, not the linseed-meal, as the pure crushed seed should contain a much larger proportion of oil. I should like to grow sufficient linseed for my own use. I rear about seventy to eighty calves. The soil here is

rich alluvial-deposit, maize-growing country. I have, even in this dry season, grown 80 bushels to the measured acre of maize without any manure to this or any previous crops. I can follow the directions for sowing the crop, &c., but would like instructions *re* harvesting, and especially threshing and cleaning. Does it require any expensive machinery? I have heard that the cost of threshing and preparing the linseed for market was the main objection to it. Any information on the point would be much appreciated.

Then, as regards making a complete and well-balanced ration for calves: As we can grow maize so cheaply here, would it be a suitable thing to mix with linseed? Or would pollard, or molasses, be more suitable? It is whey, not skim-milk, that I have to feed and rear calves on.

Would you recommend feeding crushed maize, dry, to the calves in troughs?

The Fields and Experimental Farms Division :—

We are of the opinion that you can grow linseed successfully on the rich Opouriao lands, and, mixed with maize, it is ideal food for calves. Linseed is not difficult to harvest, as the crop can be cut with the ordinary self-binder, placed in stooks and stacked in the same manner as oats, or threshed from the stook by the ordinary grain-thresher. For commercial purposes linseed requires recleaning, but this is not a serious item.

Crushed maize, fed dry and mixed with a small quantity of linseed and chaff, will keep calves in perfect health.

GRASSES.

MR. ARTHUR SIMPSON, Karamea :—

I would very much like to know what would be the best kind of grasses, &c., for planting on—(*a*) light pumice land, (*b*) wet and swampy land, (*c*) heavy land after the natural bush and scrub have been burned off, and (*d*) in a district where hot and very dry seasons prevail. Please let me know if I shall be able to obtain this from you, and the cost of it.

The Fields and Experimental Farms Division :—

(*a*.) Experiments have been carried on in pumice lands, and the following grasses have all done well. Those of the *Agrostis* and *Festuca* families seem to suit: Meadow fescue, Chewing's fescue, sheep's fescue, brown-top (*Agrostis canina*), fiorin (*Agrostis stolonifera*), red-top (*Agrostis vulgaris*), tall oat-grass, *Poa pratensis*, *Bromus inermis*, cocksfoot, crested dogstail, *Danthonia pilosa*, *Lotus major* and *Lotus villosus*, white clover, alsike, rib-grass, sheep's burnet, chicory, Western Wolths rye.

(*b*.) Cocksfoot, meadow foxtail, meadow fescue, tall fescue, timothy, rough-stalked meadow-grass, wood meadow fescue, alsike, birdsfoot trefoil major, and white clover.

(*c*.) Cocksfoot, meadow foxtail, tall fescue, meadow fescue, Italian rye-grass, perennial rye-grass, timothy, rough-stalked meadow-grass, alsike, perennial red clover, and white clover.

(*d*.) Cocksfoot, prairie-grass, *Phalaris commutata*, tall oat-grass, awnless brome-grass, rib-grass, *Lotus angustissimus*, *Lotus corniculatus*, *Lotus hispidus*, yarrow, sheep's burnet, sainfoin, chicory, Bokhara clover, wild white clover, and lucerne.

FRUIT-TREES.

MR. JOHN GREEN, Te Miro, Mangaweka :—

I should like to know what is wrong with my pear and cherry trees, and how to treat them. The leaves seem to wither, and a sort of leech feeds on the leaves, making them almost transparent.

The Orchards, Gardens, and Apiaries Division :—

It is always desirable that specimens of affected trees be forwarded for examination before advising treatment. The trees, however, appear to have been attacked by the pear and cherry slug or leech (*Selandria cerasi*). Spraying with arsenate of lead, 1½ lb. to 50 gallons of water, as soon as the young slugs appear, and, if necessary, a second time after an interval of about three weeks, will control this pest.

SILVER-BEET.

MR. G. L. SCOTT, Wharehuia:—

I have seen in the latest issue of the *Journal* (Volume vi, No. 4) an article which I am much taken up with—that is, the culture of silver-beet as a forage crop. I am a dairy-farmer, and I also keep about sixty to a hundred ewes, in lamb. I always fatten the lambs, and send them to the works for freezing. By the table the feeding of silver-beet at Belfast is simply marvellous. I intend to have some next year, about 1 acre of it. I would be much obliged if you would answer the following questions:—

1. What time of the year do you reckon best to sow it?
2. What manure does it do best with?
3. Would it do on land that has been cropped with turnip or oats (as my farm is not all stumped yet), or does it do best on new land?

The Fields and Experimental Farms Division:—

1. Silver-beet can be sown in spring and autumn, but it should not be sown in spring until there is heat in the soil.
2. The manures most suitable for this have yet to be ascertained. For experiments in the South Island the Agricultural Chemist has designed a scheme (published in this issue of the *Journal*) which if carried out will assist the farmer to decide which manures are most suitable for his soil and his climatic conditions. A heavier manuring would no doubt be required for certain districts in the North Island.
3. The land on which silver-beet is to be grown should be in good heart and well cultivated, and should receive a liberal dressing of manure. Stable manure would, no doubt, prove best.

ROTATION OF CROPS.

"READER," Rosedale, Neudorf:—

I do not remember having seen anything in the *Journal* about rotation of crops. I took a farm here of 50 acres about nine months ago, and I find the Moutere land difficult to work, as it sets hard after rain, and much of it is stony; also there is a good deal of fiorin and many blackberries. The land is also rather poor, and will not grow grass very well, while clover is practically unknown. Under these circumstances, I would like to keep the soil continually under crop of some kind. I should like to have a four-years rotation—during two of the years growing wheat and oats, both to be consumed on the farm by poultry and stock; the other two years green feed, chiefly for sheep. Will you kindly inform me (1) what green crops it would be most advisable to grow, and (2) what would be the most convenient way to arrange the rotation?

I have about 2½ acres of land that was ploughed (from oat stubble) and subsoiled last October; then disced, cross-ploughed, and fairly cleaned of fiorin; afterwards had over 2 tons to the acre of crushed limestone broadcasted, and turnips and swedes drilled. Result, a fair crop of turnips, and a moderate crop of swedes. On this land I should like to put 2 acres in wheat and the rest in lucerne.

As there was a great deal of rust among the cereal crops last year, I should like to get some rust-proof wheat if possible. What kind would you advise sowing? Considering cultivation as above detailed, would lucerne be likely to grow? Where can I get clean seed?

The Director of the Fields and Experimental Farms Division:—

A definite rotation for that district cannot well be laid down. According to the description of this property, wheat should not be grown until the soil-fertility and its condition are improved. Assuming the land to be in grass or to be broken up, although the first crop cannot be expected to be a large one, it may be rape or roots, followed with oats; then legumes (such as red clover, cow-grass, tares, or peas); afterwards temporary grasses, such as Italian rye, prairie-grass, white clover, with a light seeding of rape. This would be broken up at the expiration of eighteen months or two years at the outside. If necessary a cereal could then be grown, or the roots again resorted to. In the present instance, on the 2½ acres, it was last cropped with roots. Now the oat could be grown.

It is observed that you make no mention of manure, but that you have applied 2 tons of crushed limestone. It must be recognized that on such soils the liberal application of a true fertilizer is required. Crushed limestone will improve the condition of the soil, but cannot be considered in any direction as the equivalent of fertilizers such as bonedust, superphosphate, or basic slag. It is recommended in the first instance that you should avail yourself of a phosphatic manure for the immediate crop in view. Afterwards it is probable that basic slag would supply all your requirements.

Should you wish to experiment—and it is desirable that you should do so—I am forwarding you under separate cover a copy of Bulletin No. 25, " Soil Requirements," which indicates a simple plan to obtain information as to the results of the application of different manures.

It is observed that you are proposing to use lucerne on half an acre. It would appear that you are somewhat early in making use of this plant. If, however, you have decided to make a trial, it is suggested that it should not at the outset extend to more than a quarter of an acre. If you will communicate again the necessary seed and inoculated soil will be forwarded to you.

A rust-proof wheat is not yet known.

WEIGHING-MACHINE FOR MILK.—WASHING COWS BEFORE MILKING.

MR. N. GIBBS, Omahu Road, Hastings, Hawke's Bay :—

I understand that your Department is supplying a weighing-machine for the use of dairymen in weighing milk. I shall be pleased to know if you have any at present for disposal, and the price of same.

Re cleaning or washing dairy stock before milking: I should be pleased to know if you supply, or could recommend, a preparation for this purpose.

The Director of the Dairy-produce Division :—

A special spring balance for weighing the milk given by individual cows in dairy herds is supplied by this Division. This scale has the advantage of weighing to tenths of a pound, and up to 60 lb., and it is being used principally in connection with the semi-official testing of purebred dairy cows. The cost of it is £1 5s.

With regard to the second question, there is no need to use any special cleanser. A bucket of clean water and a cloth is all that is required to wash the udders and teats of the cows before milking, which should then be dried with a clean cloth.

FRUIT-FARMING.

MR. S. J. HOLDEN, Post-office, Kihikihi, Waikato :—

I am thinking of taking up a small holding in Te Kuiti or district, and of confining my attention to the raising of cherries and small fruits, such as strawberries, gooseberries, &c. Could you give me your opinion, and any information on the subject?

The Orchards, Gardens, and Apiaries Division :—

In the case of raising cherries the difficulty will be in saving the crop from the ravages of the birds, unless the entire block of trees be covered with wire netting of small mesh. Strawberries succeed better in heavy soils than in some of the lighter lands of the Dominion, on account of the fact that the latter are frequently infested with grass-grubs, which attack the roots of the plants, and so interfere seriously with their growth. Gooseberries should succeed well at Te Kuiti and prove a very profitable crop.

SPRAYING FRUIT-TREES AND POTATOES.—GUM FROM BUDDED PEACH-TREES.

MR. S. WYLLIE, Cracroft Street, Waitara :—

Will you be good enough to answer the following queries on matters which have caused me a good deal of thought :—

(a.) I find it impossible to obtain fresh lime. Will you therefore kindly inform me if soda may be substituted for lime in the Bordeaux mixture as a spray for fruit-

trees; and, if so, in what proportions the bluestone and soda should be used, and how the mixture should be prepared and tested? Will a kerosene-tin do for mixing it in?

(*b*.) Is Vermorite as effective as Bordeaux mixture for spraying fruit-trees?

(*c*.) After spraying potatoes I have (and it is the experience of others I have spoken to) invariably found the leaves badly burned—in fact, so severely have the plants suffered that those left unsprayed for comparison, although subsequently attacked by blight, have yielded the better crop. Is the burning avoidable?

(*d*.) Gum frequently exudes from the cut where I have budded peach-trees, covering the bud, and setting hard: is there any remedy?

The Director of Orchards, Gardens, and Apiaries Division:—

(*a*.) Bordeaux mixture made with soda is of little or no value as a spray for fruit-trees.

(*b*.) Vermorite is not considered as effective as the Bordeaux mixture for spraying fruit-trees.

(*c*.) Apparently insufficient lime or soda has been used in the preparation of the Bordeaux mixture for the spraying of the potatoes. A test with litmus paper to indicate when sufficient lime or soda has been used to neutralize the action of the bluestone will obviate the difficulty.

(*d*.) The fact that gum exudes from peach-trees after budding usually indicates that the buds have been inserted too early in the season.

EXPERIMENTS WITH ALFALFA.

MR. W. B. FRASER-TYTLER, Blenheim:—

After reading the *Journal of Agriculture* of April, page 431, of experiments on alfalfa from Portland Seed Company, Portland, Oregon, "Turkestan Alfalfa," I would be greatly obliged for information as to its growth. Will it grow on silty light ground, also medium heavy ground, and is it equal in growth and cutting to the ordinary lucerne? Also price. Having a couple of acres, I would like to experiment.

The Director of Fields and Experimental Farms Division:—

It is rather early yet to report with any degree of certainty regarding this variety, as it was only sown in the spring of last year and tests of alfalfa are not reliable until it has been grown for a year or two. The seed was sown on a great variety of soils, and so far it has done very well, but more definite and reliable results will be obtained next summer. This seed costs 1s. 3d. per pound in small lots.

TURNIPS AND OTHER ROOT CROPS.

C. K., Omakau:—

Is it customary anywhere in the South Island to sow turnips in the early spring; and, if so, what is the best variety to sow at such a time? My farm is situated in a part of Otago where, owing to the very high winds which prevail in the latter part of November and December, the ordinary pasture dries off very seriously and rapidly, leaving my stock in rather a bad plight. I had thought that, if turnips could be got to come away in the spring, it would tide over this dry spell, and some time ago I experimented in this direction, but without success. It may be that the failure was owing to the piece of ground which I tried being rather low, and perhaps a little cold and wet for the start. This year I am thinking of trying the experiment once again, but on a nice slope lying more to the sun; and I would like to know whether a spring sowing is likely to be attended with success. If you could recommend any other root crop that would be likely to meet the need I should be greatly obliged for the information.

The Director of Fields and Experimental Farms Division:—

Turnips sown in spring are apt to run to seed and not bulb, depending greatly on climatic conditions. The white-fleshed varieties mature earlier than the yellow-fleshed. Imperial Green Globe, Devonshire Greystone, and Lincolnshire Red are amongst the principal varieties. No good results can be expected from sowing seed on cold or wet land. The soil should be warm at the time of sowing. I know of no other root crop that could be sown in early spring.

THE DOMINION'S EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.	Sundry.
January,	1913	166,714	229,179	6,886	109,251	63,864	118,986	..	329	..	6,969	2,215	4,110	611 carcases pork.
,,	*1912*	*237,284*	*302,399*	*12,424*	*114,512*	*64,005*	*95,994*	..	..	*7,295*	*6,365*	*1,942*	*3,407*	*59* ,,
February,	1913	326,337	403,698	12,666	89,098	81,733	127,968	..	..	..	12,520	4,295	7,973	64 carcases pork.
,,	*1912*	*208,424*	*273,246*	*13,052*	*101,544*	*62,398*	*106,074*	*607*	..	..	*6,831*	*1,615*	*1,056*	..
March,	1913	86,224	210,166	7,428	47,560	59,844	49,661	..	115	..	12,552	7,662	4,043	250 carcases pork.
,,	*1912*	*324,192*	*518,402*	*20,201*	*64,925*	*49,308*	*70,022*	..	*4,980*	..	*3,832*	*1,352*	*2,644*	*16* ,,
April,	1913	303,937	647,948	16,834	11,358	52,934	61,988	..	300	..	9,049	3,351	3,889	457 carcases pork.
,,	*1912*	*213,178*	*355,829*	*7,046*	*38,986*	*38,137*	*31,615*	*4,905*	*2,180*	..	*5,134*	*1,958*	*4,458*	..
May,	1913	418,221	731,520	22,073	637	46,304	33,281	..	265	2,000	15,751	5,005	9,057	100 carcases pork.
,,	*1912*	*454,506*	*744,287*	*32,691*	*1,441*	*40,535*	*51,833*	*11,157*	*26,569*	*1,500*	*11,963*	*2,826*	*6,287*	..
June,	1913	315,034	528,815	24,444	79	3,166	18,741	..	..	13,072	13,592	4,065	5,439	588 carcases pork.
,,	*1912*	*170,738*	*287,697*	*24,605*	*558*	*7,712*	*18,138*	*9,160*	*7,622*	*2,039*	*5,646*	*1,168*	*1,213*	*221* ,,
July,	1913	215,713	331,353	14,030	..	1,687	17,169	5,651	300	9,190	9,682	1,720	10,793	..
,,	*1912*	*291,097*	*371,474*	*29,457*	*684*	*1,255*	*16,567*	*44,324*	*23,216*	*20,573*	*7,463*	*1,856*	*5,892*	*210 carcases pork.*
August,	1912	207,239	157,589	10,478	559	..	10,409	42,580	38,802	19,562	3,758	523	4,219	..
,,	*1911*	*66,608*	*110,054*	*3,653*	..	..	*5,260*	*31,976*	..	*18,231*	*3,443*	*303*	*3,475*	*203 carcases pork.*
September,	1912	44,657	40,759	1,174	8,723	1,204	6,671	15,742	17,363	19,933	2,957	501	3,671	..
,,	*1911*	*102,081*	*40,057*	*6,059*	*6,404*	..	*7,390*	*38,151*	..	*33,059*	*5,604*	*393*	*7,672*	*220 carcases pork.*
October,	1912	51,263	15,393	3,882	49,962	16,389	4,647	7,952	64,480	5,396	4,193	401	9,075	..
,,	*1911*	*9,417*	*2,043*	*100*	*49,626*	*11,501*	*2,182*	..	..	*32,094*	*4,514*	*754*	*2,982*	..
November,	1912	54,175	8,286	282	140,751	57,181	33,305	3,680	40,896	13,892	9,866	1,911	5,466	..
,,	*1911*	*47,770*	*10,427*	*403*	*135,741*	*57,319*	*44,934*	*15,833*	..	*16,606*	*7,844*	*2,183*	*3,085*	..
December,	1912	117,740	106,310	4,774	119,885	66,213	44,789	5,868	30,490	10,070	3,816	2,613	3,686	..
,,	*1911*	*72,192*	*91,965*	*765*	*109,397*	*46,883*	*54,297*	..	..	*4,366*	*5,719*	*1,364*	*2,708*	..

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE THREE MONTHS ENDED 31ST JULY, 1913.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. Hinds.	Beef. Fores.	Butter. New Zealand.	Butter. Danish.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila.	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila.	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
1913.							d.	d.	d.	d.	d.	d.															
May 3	..	..	..	..	..	..	4⅜	4⅛	6⅞	6⅝	3¾	3¼	113/0	117/0	58/6	57/6	..	31/0/0	28/0/0	33/0/0	31/0/0	28/0/0	34/0/0	..	..	..	..
" 10	..	..	..	..	..	..	4⅜	4⅛	6¼	6½	3⅝	3⅛	113/0	114/0	58/0	56/6	..	31/0/0	28/0/0	33/10/0	31/0/0	28/0/0	34/0/0	..	..	..	..
" 17	..	..	..	..	..	..	4⅜	4⅛	6¼	6½	3⅞	3⅛	113/0	114/0	59/0	56/6	..	31/10/0	28/10/0	33/0/0	32/0/0	28/10/0	33/10/0	..	39/0	22/6	20/6
" 23	..	..	..	..	..	..	4⅜	4⅛	6½	6¼	3⅞	3⅛	113/0	114/0	59/6	57/6	..	31/10/0	28/0/0	32/0/0	32/0/0	28/0/0	32/10/0	..	..	..	..
" 30	1/4	1/4½	1/5½	1/9	2/0	2/5½	4½	4¼	6¼	6	3⅞	3⅛	115/0	115/0	61/0	59/0	..	30/0/0	26/10/0	32/0/0	30/0/0	26/10/0	31/0/0	..	..	..	..
June 7	..	..	..	..	..	..	4½	4¼	6½	6⅛	3⅞	3⅛	115/0	115/0	60/6	58/6	..	29/0/0	26/0/0	31/0/0	29/0/0	26/0/0	31/0/0	..	39/0	..	21/6
" 14	..	..	..	..	..	..	4½	4¼	6½	6⅛	3⅞	3¼	113/0	116/6	60/6	58/6	..	28/10/0	25/0/0	29/10/0	28/10/0	25/0/0	29/10/0	..	..	23/0	21/6
" 21	..	..	..	..	..	..	4½	4¼	6⅝	6	3⅞	3¼	113/0	121/0	61/6	59/6	60/6	28/10/0	24/15/0	30/0/0	29/0/0	25/0/0	29/10/0	..	..	..	..
" 28	..	..	..	..	..	..	4½	4¼	6¼	5⅞	4	3¼	115/0	..	63/6	61/6	62/0	30/0/0	26/10/0	30/0/0	30/10/0	27/0/0	29/10/0	..	..	..	..
July 5	..	..	..	..	..	..	4½	4¼	6	5⅝	4⅛	3⅛	..	..	65/6	63/6	65/0	29/10/0	26/0/0	29/0/0	29/10/0	26/0/0	29/0/0	37/0	39/0	22/6	20/0
" 12	1/3¾	1/4	1/4¾	1/8½	1/11	2/4¾	4⅜	4¼	5¾	5⅜	4⅛	3⅛	..	..	67/0	65/6	65/6	29/0/0	25/0/0	..	..	..	29/0/0	..	..	..	..
" 19	..	..	..	..	..	..	4⅜	4$\frac{5}{16}$	5$\frac{11}{16}$	5¼	..	..	..	..	66/6	65/6	64/6	29/0/0	24/15/0	29/10/0	29/10/0	25/0/0	29/10/0	..	39/6	..	21/6
" 26	..	..	..	..	..	..	4$\frac{5}{16}$	4$\frac{3}{16}$	5¾	5$\frac{5}{16}$	4⅛	3⅛	..	..	..	..	..	..	25/0/0	..	..	25/10/0	30/10/0	..	..	..	..

HEMP AND TOW GRADING RETURNS.

JULY.

Hemp.—The total number of bales graded was 9,487, as compared with 4,621 for the corresponding month of last year, an increase of 4,866 bales. For the twelve months ending 31st July, 1913, the number of bales graded was 150,527, as compared with 91,972 for the previous twelve months, the increase being 58,555.

Tow.—During the month 3,261 bales were dealt with, as compared with 1,549 for the corresponding month of last year, an increase of 1,712 bales. For the twelve months ending 31st July, 1913, the number of bales graded was 52,265, as compared with 25,377 for the previous twelve months, the increase being 26,888 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF JULY, 1913.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.	Common.	Rejected.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	330	1,332	213	11	11	1,897
Napier ..	..	20	61	34	..	..	..	115
Foxton ..	..	..	337	2,244	38	7	..	2,626
Wellington ..	..	..	900	2,066	66	6	..	3,038
Blenheim ..	..	46	137	..	..	..	..	183
Picton ..	..	61	140	222	17	..	..	440
Lyttelton ..	..	30	..	..	..	..	..	30
Timaru ..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	106	575	32	13	..	726
Bluff	..	..	137	271	24	..	..	432
Totals ..	..	157	2,148	6,744	390	37	11	9,487
Percentages of totals	..	1·65	22·64	71.09	4·11	0·39	0·12	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	311	484	77	872
Napier	4	31	3	..	38
Foxton ..	..	453	230	29	712
Wellington ..	85	370	340	8	803
Blenheim ..	26	36	..	..	62
Picton	71	135	52	..	258
Lyttelton ..	32	53	..	..	85
Dunedin ..	..	10	39	87	136
Bluff	..	11	126	158	295
Totals ..	218	1,410	1,274	359	3,261

Stripper-slips.—Passed for export: Foxton, 35; Picton, 19; Lyttelton, 14—total, 68. Condemned: Wellington, 21.

NEW ZEALAND-SAN FRANCISCO TRADE.

THE following are the shipments of produce for San Francisco, Rarotonga, and Tahiti, and transhipments for Vancouver from New Zealand, since March last:—

—	"Aorangi," 28th March.	"Tahiti," 25th April.	"Moana," 23rd May.	"Aorangi," 20th June.	"Tahiti," 18th July.
Gum, packages	50	..	30	45	6
Seeds, sacks	31	61	..	800	450
Grain, &c., sacks	57	115	84	59	75
Meat, cases	262	250	355	154	152
Onions, cases	10	8	19	13	5
Potatoes, sacks	32	10	27	24	9
Sundries, packages ..	131	235	210	122	370
Butter, boxes	3,783	405	8	4	792
Hemp, bales	..	271	394	262	371
Frozen lamb, carcases ..	3	2	2	2	2
,, mutton, ,, ..	..	..	..	..	30
,, veal, ,, ..	..	..	..	..	..
,, beef, quarters ..	..	..	..	..	32
,, sundries, packages ..	..	13	..	..	5
Timber, pieces	93	..	..	1,151	..

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since February last:—

—	"Zealandia," 14th Feb.	"Marama," 14th March.	"Makura," 12th April.	"Niagara," 10th May.	"Marama," 6th June.	"Makura," 5th July.
Butter, boxes ..	5,205	9,402	6,535	465	1,210	4,401
Mutton, carcases	..	..	..	1,291	50	65
Beef, quarters ..	..	1,254	2,428	5,492	2,271	3,520
Veal, carcases ..	181	400	402	324	..	..
Frozen sundries, packages	39	147	86	79	90	471
Wool, bales ..	..	..	..	50	351	835
Grass-seeds, beans, &c., sacks	54	..	147	..	..	75
Hides and skins, sacks, &c.	583	..	249	270	1,675	748
Onions, cases ..	1,572	..	732	25	..	..
Sheep-skins, bales	112	..	24	..	..	522
Jam, cases ..	75	175	25	91	75	20
Sundries, packages	250	214	470	112	103	189
Potatoes, crates	..	..	..	..	..	..
Kauri-gum, packages	176	41	7	150	44	..
Hemp, bales ..	129	126	..	126	167	97
Rabbits, crates..	..	..	..	..	500	15

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of July:—

Port of Shipment.	Horses.		Cattle.		Sheep.			Dogs.	Poultry, in Crates.		Pigs.	
	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To South America.	To Australia.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.
Auckland ..	..	9	12	16	57	232	..	6	5	24	2	40
Napier ..	..	..	..	..	30	..	..	..	1	..	..	..
Wellington	52	..	..	..	14	..	..	7	..	..	..	..
Lyttelton ..	27	..	..	..	265	..	6	..	..	..	..	..
Dunedin ..	87	..	..	..	52	..	16	5	..	..	..	..
Totals ..	166	9	12	16	418	232	22	18	6	24	2	40

The following are particulars of horses shipped: Draughts—10 stallions, 32 mares, 6 colts, 11 geldings, 30 fillies; thoroughbreds—1 stallion, 2 mares, 1 filly; hacks—1 gelding; harness—8 mares.

The following are particulars of sheep exported: Border Leicester—2 rams, 50 ewes; English Leicester—50 rams; Corriedale—215 rams, 6 ram hoggets; Lincoln—16 rams, 30 ewes; Romney Marsh—1 ram, 13 ewes; fat sheep—287.

28 fat bullocks were also exported.

PRODUCE IMPORTED.

THE following return, compiled by the Customs Department, shows the total importations into New Zealand during the month of July, 1913, of agricultural and farm products:—

Item.	Quantity.	Value in £
Chaff	231 tons	924
Fruits, fresh, all kinds	1,884,334 lb.	14,493
Oats	138 centals	57
Wheat	24 centals	15
Onions	7,132 cwt.	2,909
Pollard and sharps	101 tons	474
Potatoes	3 tons	46
Seeds, grass and clover	1,079 cwt.	3,200
Total value imported ..	..	£22,118

The steamer "Corinthic," which sailed from Wellington for London on the 10th ultimo, had on board the following cargo for Monte Video: From Hobart, 9,700 cases apples; from Wellington, 250 cases apples, 10 cases wire-strainers, 10 barrels oil, 13 packages trees, and 4 packages sundries.

STOCK IN QUARANTINE.

THE following stock were received into quarantine during the month of July:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			MOTUIHI ISLAND (AUCKLAND).		
1	Yorkshire terrier..	Male..	Sydney ..	Mrs. Rendell ..	Auckland.
1	Bulldog.. ..	,, ..	Liverpool	N.Z. Express Co...	Lyttelton.
1	Collie	,, ..	,,	,, ..	Wellington.
1	,, ...	Female	,,	,, ..	Lyttelton.
6	Collie pups ..	Male..	Dropped on voyage	,, ..	,,
1	Bulldog.. ..	,, ..	Lautoka (Fiji)	W. J. Perrean ..	Melbourne.
			SOMES ISLAND (WELLINGTON).		
1	Pug-dog ..	Female	London ..	Mrs. Dean ..	Whangamomona.
1	Fox-terrier ..	Male..	,, ..	W. A. Smith ..	Napier.
1	,, ..	,, ..	,, ..	J. A. Sinclair ..	Taupo Quay, Wanganui.
1	Collie	,, ..	,, ..	Mrs. Porter ..	Wellington.
1	Jersey bull ..	,, ..	,, ..	J. A. McCrea ..	Palmerston North.
1	Aberdeen terrier ..	,, ..	,, ..	W. P. Maule ..	Wellington.
			QUAIL ISLAND (LYTTELTON).		
1	Pomeranian dog ..	Male..	London ..	Dr. Houghton ..	Auckland.
1	Bull-terrier ..	,, ..	,, ..	R. B. Wood ..	Ashburton.
1	Schipperke dog ..	,, ..	,, ..	,, ..	,,
1	Shropshire ram ..	,, ..	,, ..	Lincoln Agricultural College	Lincoln.
1	Collie	Female	,, ..	J. Lilico ..	Lochiel.
2	Collie pups ..	,,	Dropped on voyage	,, ..	,,
2	,, ..	Male..	Ditto ..	,, ..	,,
2	Pekingese dogs ..	,, ..	London ..	G. Humphries ..	Christchurch.

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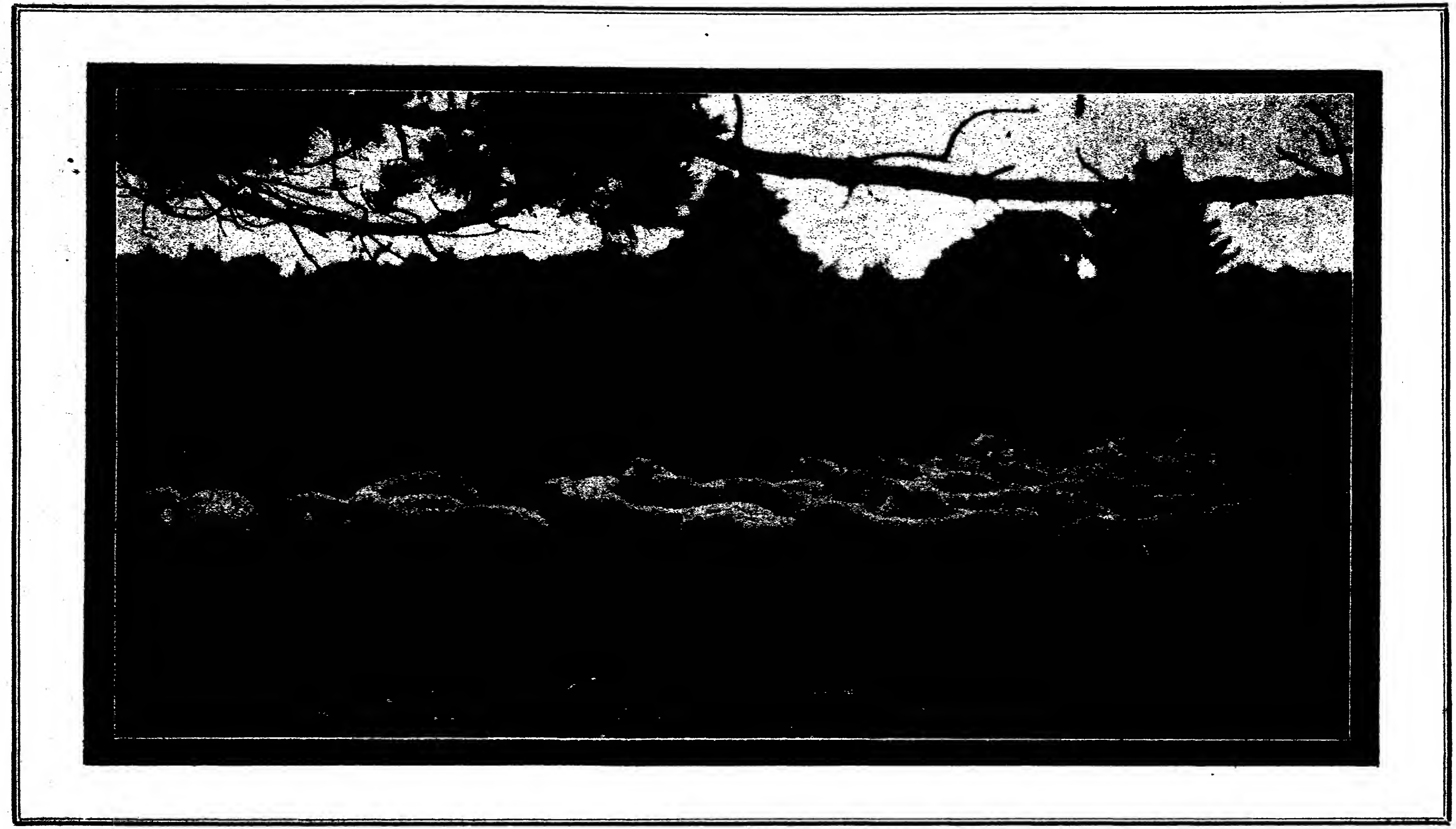

Romney Sheep at Pasture.]

The

Journal of Agriculture.

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ROMNEY MARSH SHEEP.

THE BREED IN NEW ZEALAND.

R. Tanner.

OF all the breeds of sheep introduced to New Zealand there is none which promises to hold the same pre-eminent position in the sheep-breeding world of the Dominion as the Romney Marsh or Kentish sheep.

An historical review of the breed does not come within the province of this article. It is sufficient to note that the breed is one of the oldest known to Britain—Arthur Finn, the well-known Home breeder, tells as an historical fact of the formation of a "town flock" at Lydd as far back as 1572—and that no reliable information is available as to whether it has escaped the introduction of blood of another breed to which so many British breeds

have been subjected. This question is referred to in a monograph on the breed in the handbook on "British Breeds of Live-stock," issued by the British Board of Agriculture in 1910. The reference reads, "It owes its hardiness to the improvement of the breed having been accomplished much more through selection of the best within the breed itself than by crossing with the improved Dishley Leicester, and to the natural method of management, which permits the British flocks to find their own food on unsheltered pastures in place of being hand-fed and pampered like other low-country sheep. This practice necessitates their lambing, like the Scotch mountain-sheep, in April." Even in the history of the New Zealand Romney there have been critics ready to assert that other blood was utilized by the pioneers of the breed in this country to bring about that refinement of form and improved character of fleece which distinguish the New Zealand Romney from the parent type of Kent. I prefer to believe that environment has been the responsible factor. The Lincoln provides a parallel case; and no one would credit for a moment that outside blood has been introduced to the great longwool breed in this country to make it finer and better woolled than the Home type.

While it is an admitted truth that sheep as a race are more susceptible to harm from an unsuitable environment than any other family of domestic stock—being, as it has been well expressed, "creatures of environment"—it may well be argued that the Romney provides an exception to this rule. Certain it is that there is no other breed of sheep which will thrive as well under diverse conditions and which will adapt itself with such a remarkable degree of success to so many variations of climate and soil. So adaptable, indeed, is the Romney that it readily assumes a new character of frame and fleece to suit a changed environment, becoming, in fact, a different type of sheep, and this without any weakening of that great utility character for which it is famed—robustness of constitution.

While New Zealand is a favourable habitat for many breeds of sheep—the merino and the leading British breeds finding a congenial home in different parts of the Dominion—it is becoming generally recognized that the Romney is a breed eminently suited for a very large area of our sheep-country, especially in the North Island. Where moist conditions prevail for any period, as is the case in much of the country devoted to sheep-farming, the Romney thrives while other breeds fail. This appreciation has been emphasized by the disastrous experience of many who have endeavoured to breed certain varieties of sheep in an unfavourable environment.

That the Romney is a hardy sheep eminently suited to New Zealand conditions — particularly those of the North Island — is generally recognized; but it is not so well known that in its natural habitat it has been developed to the objective of making it a hardy, useful animal which will thrive under ordinary conditions without the need of special treatment. In this connection the following observation is made in the handbook of the British Board of Agriculture: "During the 'thirties' and early 'forties' of the nineteenth century, grazing contests which created widespread interest were held throughout the Romney Marsh area under the management of local committees. Certain grazing-lands were selected, and the sheep entered for competition were removed from the control of their owners and placed under the supervision of judges, who determined, on their merits, which were the most useful sheep. The sheep were kept and shepherded under natural conditions, no artificial food or fodder being supplied."

The Romney has further established itself in favour with the New Zealand sheep-farmer owing to its general-purpose character. In the early days of the sheep-breeding industry of the Dominion wool was the only product of the sheep which was worth cultivating, but with the development of the frozen-meat trade, and latterly the value of the fat-lamb business, the general-purpose character of the Romney has appealed to the farmer. At one time a certain unjustifiable prejudice existed in this country against Romney meat on account of what was said to be a yellow tinge in the fat. Whether this were so or not at one time, it is certainly not the case at present.

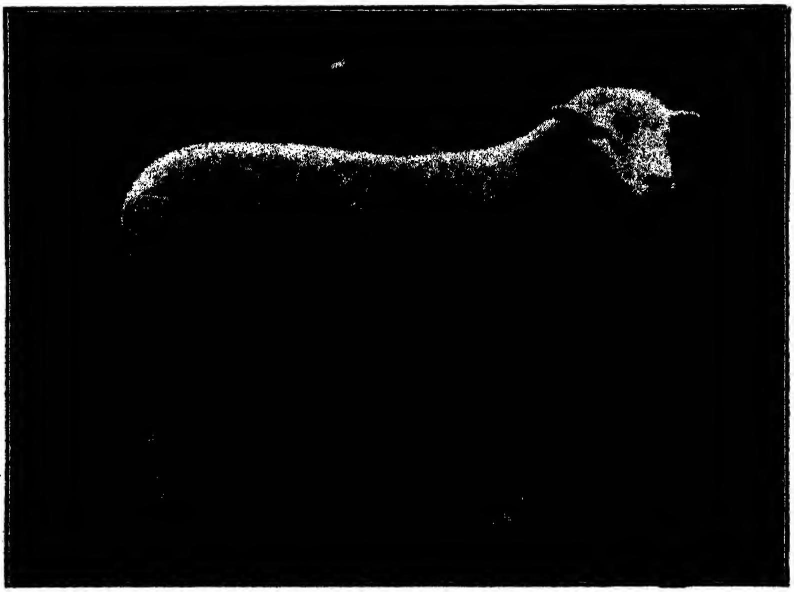
It is instructing to consider the Home opinion of the Romney from a mutton point of view. To quote again from the handbook of the British Board of Agriculture: "The backs of fat sheep are somewhat hard to the touch, and both the top of the shoulder and the backbone are liable to stand out too prominently; but the mutton is classified in the market next to Down mutton in quality, as it is not only finer in texture but proportionately leaner than that of other longwools."

Undoubtedly under New Zealand conditions the Romney has been developed into a higher type of animal. Not only has the fleece been greatly improved by judicious selection, but the carcase has been refined, thus giving an animal of improved commercial quality, while its characteristic hardiness has been retained. As a mother the Romney excels, her capacity to nurture her young well making her the best ewe we have for the production of fat lambs. Crossed with the Southdown an ideal combination is secured. Quality and early maturity are obtained with hardihood, size, and

rapidity of growth of the milk lamb, thereby furnishing the best all-round and most economically produced lamb we have. As an all-purpose sheep the Romney is supreme, and as the business of sheep-farming in this country is driven farther back to make room for dairying and other industries of the smaller settler, the Romney must extend its circle of admirers and further prove its undoubted good qualities.

THE IDEAL TO AIM AT.

Having in the Romney a sheep of great all-round value combined with a hardihood which makes it most suitable for New



A NEW ZEALAND TYPE OF ROMNEY.
Bred by Mr. W. Gibson, Kiwitea.

Zealand conditions, it is imperative that we should maintain these characteristics unimpaired; in other words, that we should not aim at producing a great fleece of superior quality and expect a good mutton carcase and a sound-constitutioned and prolific animal at the same time. The objective should be that, while growing a good payable fleece, the animal should be maintained at a good standard in which constitution will be the dominant factor. Given constitution, the characteristic hardiness of the Romney will be retained, while it will still remain the great mother and prolific breeder it is. One character cannot be developed to an exceptional degree without impairing others, and it is the possession of

several commercial qualities which makes the Romney so valuable. The Romney can produce a profitable weight and quality of wool, furnish a good mutton carcase, and be the best fat-lamb mother in the country if only it be bred to its true type and be saved from show-ring fads or the work of the breeder aiming at sensational results. It should be emphasized again that nothing should be allowed to detract from the great value of the Romney as a fat-lamb mother, for in the future more than in the past the most successful ewe in the production of early lambs—given other useful qualities—will be the most useful sheep in the country. If everything is to be sacrificed to wool, if the sheep are to be pampered

An English Type of Romney.
Bred by the late Mr. C. File, Elham, Kent.

to this end, and if constitution is to suffer in the process, there is little doubt that the breeding and mothering qualities of the breed will suffer.

What a Romney should be.

As acclimatized in New Zealand the Romney is essentially a farmer's sheep. Therefore before all things it must be an animal of undoubted constitution. Given this, it should carry on a symmetrical frame a fairly dense, good-stapled wool of strong quality.

The ram should not have a feminine appearance, as is too often the case at the present time. He must first and last be a sire, and one of the best indications of this is a striking head full of character and with an animated appearance. He should have a keen, full eye, and should possess the true Romney nose—a good bridge—and full, powerful face, with a wide nostril and strong jaws. The ears should be thick, of medium length, and covered with thick, white hair. The face should be covered with short, white hair, and the hair should lie close and smooth on the face. There should be no blue about the eyes, and the nostrils should be black. The character of the head is invariably a reflex of the character of the sheep. The head should be well set on a thick short neck, which should be carried well up from broad shoulders. The chest should be deep, wide, and prominent. The back should be wide, long, and level, with a well-sprung and deep barrel, and the flank almost level with the under-line; the deep girth being particularly desirable, as it is one of the best indications of constitution. The thighs should be thick and well let down. The animal should stand well—covering a lot of ground—on short legs having good sound bone. The feet should be strong and preferably black in colour. The Romney ram should be covered with a fleece of stronger character than the quality of the wool being aimed at in the flock, but this must not be confused with harshness or coarseness. The animal should be covered well to the points, and particularly so underneath, for as the ram is covered so will the progeny be. Special care should be taken to keep kemp out of the fleece. Evenness of fleece is always to be preferred to a fleece which is particularly good on one part of the carcase and weak on another part. Avoid "tippy" wool as much as possible.

The ewe, as with the ram, must have constitution. She should in the main be a modified edition of the ram, a feminine counterpart. It is a common mistake to look for a weak head in the ewe, whereas a strong face is most desirable. I have never bred a good-constitutioned ram from a weak-faced ewe. Naturally, the fleece of the ewe is of finer quality than that of the ram.

ROMNEY WOOL.

Romney wool has a character of its own. Combined with good length of staple, it should have a crimp from the pelt to the tip and have a golden lustre. It should be fairly close on the pelt, as close as is consistent with length. Absence of cross fibres and freedom from kemp are desirable attributes. The fleece

of a good four-tooth ram should weigh 20 lb., and of a ewe of the same age about 15 lb. This is when given ideal growing conditions.

Unfortunately, there are many variations in the type of wool produced in this country at the present time. No doubt this is due in a large measure to the different conditions under which the sheep are bred and reared. Even sheep brought from one district to an adjoining one often change the character of their fleece after the first season, while even a change of environment within the one district—due partly to the different soil—will have a marked effect on the wool-character. This remarkable influence of environment on Romney wool is a reflex of the change which takes place in the Romney itself when removed from one type of country to another. While this has its disadvantage it also provides a powerful argument in favour of the contention that the Romney is the most valuable sheep for the farmer in general. It is adaptable in the highest degree, and will thrive under a greater variety of conditions than any other breed of sheep will. On rich, flat country it takes on a larger size and grows a heavier fleece than when bred on rolling downs or hills. Indeed, the Romney provides for the farmer within a very brief space of time a breed suitable for his particular conditions, and this fact is no doubt responsible for the increasing appreciation of the breed in other countries. This adaptability of the Romney should suggest to farmers taking up the breed the desirability of studying the type best suited to their conditions.

A decided change is taking place in the class of wool being favoured by breeders. With the increasing demand for Romneys from farmers in bush country a longer-stapled and, consequently, a better-wearing wool is increasing in popularity, and breeders are endeavouring to meet the demand. It is to be hoped that this demand will not have the effect of inducing short-sighted breeders to bring in blood of other breeds to secure the wool in demand. There may be some excuse to do so in altering the fleece of certain breeds, but with the peculiar adaptability of the Romney there should be no reason to look to another breed to secure the desired modification. This is assuming that there is a limitation to the modification desired. It is sheer folly to attempt to ask the breed to do something which will affect its great combination of utility characters. The foreign buyer looking for Romney blood in this country is not to be put off with a Romney-Lincoln type, but wants a sheep possessing all the general-purpose characteristics of the breed; in short, he wants a Romney.

A cause contributing to the want of uniformity in our Romneys, and even to great variations in individual flocks, is the failure of breeders to aim at the one type, purchasing rams from a different breeder every year, irrespective of whether the type be that of their flock or not, or whether it be even of pure descent. The result of this continual increase in the mixture of strains is that probabilities of variation are multiplied, and the difficulty of maintaining uniformity in the flock is intensified.

MANAGEMENT.

It is due, no doubt, to the absence of an adequate appreciation of the importance of type and constitution—the rigid maintenance of which by Home breeders has earned for the breed its reputation for hardiness—that the standard of the Romney in this country is not being maintained. Culling, essential in the maintenance of these characters, is not being done as closely as it should be. In my own stud flock I never use a sheep when it shows any divergence from type, no matter how good its constitution, or its fleece, or its frame. The first loss is the best. Even with the ordinary farmer culling is imperative if a fair standard is to be maintained in the flock. He may not require to be as particular as the stud breeder, but if he neglect type and fail to appreciate the importance of constitution, he will soon discover his profits are not what they should be. I find it a good rule never to use for breeding purposes a sheep which is addicted to scouring, as it generally follows that the progeny are liable to the same complaint and never thrive as they should.

An essential feature in the management of Romneys is always to have the young sheep on good clean pastures, while turnips or swedes are necessary in the winter when grass is short. In districts where the paddocks are practically bare in the winter it would be necessary to provide some hay or chaff to feed with the roots. I find that green barley or green oats are better feed for the sheep in the spring than dry feed, such as oats and chaff. The only green feed I have found undesirable to use is Algerian oats. It is well not to get the young rams in too high a condition. They will always do well on clean green feed. A fact to be remembered by the breeder and the farmer is that it never pays to bother with a weak animal, and, unless the breeding-stock be well culled and only animals of good constitution be bred from, weaklings will always have to be reckoned with. Constitution is the basis of profitable breeding. The good-constitutioned animal is always in a marketable condition.

TUBERCULOSIS.

ONE MEANS BY WHICH PIGS MAY CONTRACT DISEASE.

C. J. REAKES, D.V.Sc., M.R.C.V.S.

FARMERS in the Dominion have from time to time had brought under their notice the existence of the danger of pigs contracting tuberculosis through being allowed to have access to the droppings of cattle, seeing that there is always a possibility of one or more of the cattle being affected with the disease. It will be remembered that in the Glen Oroua experiment certain cases of tuberculosis in pigs were traced to infection obtained through running in the same paddock with cattle which were found to be affected. It is a well-known fact that many tubercular cattle expel the germs of the disease from their system with their dung, and in a recent report of the Bureau of Animal Industry of the United States a very striking instance was given of the readiness with which pigs may become infected with tuberculosis through the means of droppings of tubercular cattle. The instance mentioned in the United States report is of a herd of cows known to be extensively affected with tuberculosis. The droppings of this herd were daily cleared out and thrown into a yard in which pigs were kept. (It must be borne in mind that in the northern part of the United States cattle are wholly or partially housed during the winter months.) The cattle were not permitted to enter the yards in which the pigs were kept, and the pigs never had access to the shed in which the cattle were housed. It was found that there was good reason to believe that more than half the pigs that remained in the pig-yard and rooted in the manure pile contracted tuberculosis within six months. A further effect noticed was that pigs born in the yard did not, so far as could be determined, contract the disease until after they had been weaned.

A good constitution is an absolute necessity in a dairy cow. Owing to the very great strain on a cow giving a large quantity of milk, she is more prone to colds and ailments of various kinds than one which is only rearing her calf. Also, it should always be remembered that young stock from very heavy milking cows require extra care and feed, as they would otherwise seem to thrive less well than do the offspring of moderate milking cows.—*Journal of the Royal Agricultural Society of England.*

DAIRY-FARMING.

PRIMROSE McCONNELL.

CALF-REARING.

SUCH a paper as this can deal only in a superficial manner with the subject of dairy-farming, but I would just like to say a few words on the subject of calf-rearing. I may state that my experience in the hand rearing of calves has possibly been as great as that of any one engaged in farming in this country, but in some of my conclusions in this direction it is probable that many will not agree with me.

Heifer calves will one day become members of the dairy herd, and on them will the dairyman's future livelihood depend. He should therefore treat them as he would his best friends, and give them every chance to show what they are worth by judiciously feeding and caring for them from their birth. It is often urged that it is disastrous to keep the dairy heifer calf in high condition, and that such a system tends to decrease her ability for milk-production. Of course, one's reason must be exercised in everything, but if liberal feeding destroy the inherent dairy qualities of a heifer calf, it is only reasonable to conclude that under similar liberal treatment the bull will become valueless as a sire of high-class dairy stock. Possibly some can quote instances where heifer calves the daughters of sires and dams possessing great pedigrees of performance, reared in a liberal manner, have turned out to be of little value as milk and butter-fat producers. But is it certain that the dairy qualities of these calves would have been changed by any other system of feeding? Every experienced breeder knows that, breed and feed as carefully as he may, he will occasionally be greviously disappointed in his heifer calves. I contend—and my experience justifies my contention—that if a heifer calf be born possessed of inherent dairy qualities those qualities will not in any way be destroyed, but will rather be developed by liberal treatment. Also, it is just as true that "the calf is mother to the cow" as it is that "the child is father to the man," and, when it is considered that excessive milk-production means an enormous demand on the energy of the cow, it can easily be understood that too much pains cannot be taken in developing a foundation upon which to build that energy. The treatment

of the dairy heifer should therefore be on very liberal lines, and it should be remembered that, being naturally of a very nervous temperament, she should be handled in such a manner as to give her confidence in her attendants. There are exceptions, but, as a rule, the vicious heifer is made so by rough treatment. It is the common opinion that the cow which is always thin is the greatest producer of milk and butter-fat, but exhaustive experiments have proved that this opinion can be supported no longer, and that in nine cases out of ten it is the big, strong, roomy cow which carries a fair amount of flesh that is most profitable.

A very good illustration of this is found in the best Holstein cows at Weraroa, and also in the Ruakura herd it is the *thin* cows which give the *lowest* percentage of butter-fat. I also contend that the thin, weedy cow which is a great milker cannot possibly stand the strain through many generations—that you cannot make a cow with an indifferent constitution into a mere milking-machine and expect it to last through generation after generation without seriously affecting that constitution. I do not consider that much harm is done by breeding from what we call immature heifers, if they have been treated liberally from the date of their birth; but if they have been half-starved as calves, immature breeding will be disastrous.

In rearing high-class dairy calves I have found that the following system gives the best results, and, at least in the case of the heifer calves from the best cows, I would strongly advise dairy-farmers to give it a trial: For the first three weeks new milk, at the end of which time the calf should be taught to eat a handful of dry crushed oats and crushed linseed in the proportion of four parts of oats to two of linseed. An easy way of teaching the calves to eat is to put the oats and linseed in the bottom of the pail after the calf has finished its milk, but ***never on any account mix*** it with the milk. The new milk should be gradually substituted by separated, and the dry meal at the same time increased until at the end of six weeks the ration has been gradually changed to separated milk entirely and, say, $\frac{3}{4}$ lb. oats and $\frac{1}{4}$ lb. crushed linseed. This ration of dry feed will cost about 5d. per week. Good hay should, if possible, be available; also plenty of good drinking-water and a supply of rock salt. In many instances better results would be obtainable by using only half the quantity of separated milk and substituting for the other half dry feed as suggested above, and the spare separated milk may be fed more profitably to the pigs. Recent experiments were carried out at Woburn with five different systems of calf-rearing, and the system I have described gave the best results

not only previous to weaning-time, but also after; even better than when only new milk was used. (While preparing this paper a bulletin from the Michigan College of Agriculture, giving the results of various calf-feeding experiments, has come to hand; and these results also confirm the above recommendation.)

Gruel or porridge may be entirely dispensed with, for, after using many tons of cream and milk equivalents, I have no hesitation in stating that, except when a dairy-farmer is retailing his milk at a high price, these meals are, as a general rule, not worth the money paid for them. In actual experience, when necessary to give porridge, I have found nothing to equal a mixture of sound crushed linseed and pure wheatmeal—that is, the flour with all the bran in it—in the proportion of four parts of linseed to one of wheatmeal. This should be either steamed or mixed with boiling water, and should be allowed to stand a few hours before using. Crushed linseed should never be steeped in cold water alone, as it develops a poison which is very injurious to the health of the calf. The meal, however, may be mixed with cold water in the first place, if it be immediately afterwards treated with steam or boiling water.

When calves are turned out to graze, the pasture should be sweet and clean; the paddock that is used year after year for this purpose is the source of many calf troubles. Allowing all the calves to drink from one trough at the same time cannot be condemned too strongly, especially when the trough is not kept thoroughly clean, and every calf-feeder knows that some calves will not drink half the milk that others will in the same time, and thus some are starved and others bloated. A common and often fatal ailment among calves is due to the curdled milk in the stomach becoming so hard and tough that it cannot pass into the bowels. Such a condition ultimately affects the brain, and the calf dies as if in a fit.. I have found that a pinch of carbonate of soda stirred into the milk is a sure preventive of this trouble. An expert feeder of calves will never commence feeding until he has satisfied himself as to the state of their bowels, and if there be any tendency to scour he has every chance of checking it in the initial stage. He will also scrutinize each calf and be able to tell at a glance whether it is suffering from any other ailment. Calf-feeding is often carried out anyhow and by any one, but it should be one man's job, and, if complete success be expected, it must have very careful attention on the part of the feeder.

As winter approaches calves should be housed at night in a dry shed, if possible, particularly in low, damp country, and they should receive hay and a little sweet oat-sheaf chaff. A ration of roots may be added with the best effect.

CO-OPERATION.

Now, there is just one other subject that I would like to mention, and it is co-operation. The importance of this matter cannot be emphasized too strongly. Every dairy-farmer should be a member of that association which represents the dairy interests of his country. In New Zealand there is a tendency to imagine that we are leading in the matter of co-operation, but we are far behind some other countries where the system has been in vogue for a considerable period. A few years have sufficed for co-operative dairy-farming to bring the country of Denmark out of a state of penury into a condition of comparative affluence. It has been truly said that it is by individual effort that true advancement is made, but the efforts of individuals are infinitely more effective when working in combination, which need not in any way destroy individuality. Not only should farmers co-operate in the manufacture and sale of their dairy-produce, but it should be their aim to co-operate in dealing with everything they buy and sell. In Britain co-operative societies in the towns have been in a most flourishing state for a number of years, the turnover now exceeding £100,000,000 per annum; and agricultural co-operation, although only comparatively new, is increasing at an enormous rate. Twenty years ago there was not a single central agricultural association in the three kingdoms. In Ireland alone there are now three hundred and forty creameries, two hundred and forty credit societies, one hundred and sixty agricultural societies, fifty-two industrial societies, twenty-six poultry societies, ten flax societies, twenty beekeepers' societies, eight bacon-curing societies, four federations, and about twenty miscellaneous societies. Last year the sales effected through the agricultural societies of Britain amounted to one and a half million pounds.

There are too many people in New Zealand under the impression that all other countries are asleep except their own, and it is just the kind of feeling that in the end leads to stagnation and stimulates a pride which is not desirable.

In England, one of the largest societies affiliated is the Eastern Counties Farmers' Co-operative Association, Ipswich. Its turnover, which amounted to £30,000 in 1905, now amounts to £200,000, and the so-called capital is less than £1,000. The seven hundred members farm an average of 300 acres, which should be sufficient proof that co-operation has a great deal to offer even the large as well as the small farmer. The work of the association is managed by a trading committee of farmers, with an efficient staff. This organization even employs a pig-buyer, who visits the markets all over the country, protects the members' interests against rings, and provides expert advice as to feeding and the

requirements of the market. This association supplies its members with everything they need, from implements, engines, bicycles, coal, and lubricants to milk-carts, manures, fencing-material, barometers, and paint; and it is only one among many others scattered over all the three kingdoms. In connection with these associations are co-operative dairy factories for supplying the neighbouring towns; some specializing in sterilized bottled milk, others in cheese or butter. As feeders to the factories, motor service is being rapidly established. Co-operative agricultural banks are also proving a great success, and the losses in connection with them are almost nil. Co-operation has even extended to the Orkney Islands, and, on eggs alone, about £1,000 more is paid to the crofters than they would receive by selling through a middleman.* In the light of what is being accomplished by the aid of co-operation all over the world it is impossible to cast any doubt on its benefits.

CONCLUSION.

Dairy-farming may have its seamy side, but, on the other hand, it has its compensations; for, after all, is there any sight more pleasing to the eye, or is there anything more likely to fill the pocket, than a first-class herd of dairy cows? There is the great difficulty of labour, and in many instances it is difficult to keep young members of the family, or the employees, attached to the land; but is it not possible that their surroundings may be made a little more attractive in order to enable them to forget for a space the perpetual routine of dairy-work which otherwise may become monotonous? I fully admit the difficulties of the labour question, and as long as we neglect to make the surroundings of the farm hand reasonably attractive the enticements of city life will prevail. Even in the case of the farmers' own family the conditions are often such as are likely to engender an extreme dislike for country life, and surely no class is more deserving of the luxuries of life than the people on the land.

A great deal might be said of the necessity for extreme care in handling the cows in the dairy shed. Cleanliness and swift milking are essential, and all the work in connection with the milking-shed should be carried out without bustle, but with the utmost expedition. The motto should be "SILENT ENERGY."

* The Washington correspondent of the London *Times*, writing recently on the languishing of agriculture in the United States of America, makes the following statement: "One of the greatest obstacles to commercial prosperity and success in the United States is the fact that there is no co-operation among the farmers, and that most of the farming is devoured by the middleman, practically through the agency of the bankers. Wherever co-operation among farmers has been established, prosperity has been the result."

AVIAN DIPHTHERIA.

H. A. REID, F.R.C.V.S., D.V.H., F.R.S.E.

DURING the past month I have had occasion to deal with an outbreak of diphtheria affecting poultry. As the disease in question is not of uncommon occurrence a short account of it may be of interest to some readers.

Avian diphtheria, as the name signifies, resembles in its local manifestations the appearance associated with diphtheria attacking the human subject. The principal and most obvious lesion consists of the development of so-called "false membranes" upon the mucous surface of the mouth and upper respiratory passages. These false membranes take the form of a greyish-white, firm, cheesy-looking material, representing the accumulation of an inflammatory, fibrinous exudate upon the surface of the part attacked. They more or less cover the inside of the mouth, tongue, and gullet, and very often extend into the windpipe.

Two forms of avian diphtheria occur — the acute and the chronic. The acute form is marked by sudden appearance of illness on the part of the bird attacked. It no longer runs up to be fed, but stands isolated from the rest, with head down, breathing heavily, the respirations being accompanied often by a wheezing or hissing sound. The sick bird quickly loses all bloom; it does not perch, but remains moping on the ground. In two or three days' time the characteristic false membranes are evident, particularly when the mouth is opened. These gradually cover the inside of the mouth, and extend on to the external portions of the beak, sometimes occluding the nostrils and producing partial suffocation. The eyes are frequently implicated, and the dry, cheesy-looking material can be seen adhering to the eyelids, which are kept closed. The eyes themselves frequently become ulcerated. The affected bird cannot eat, diarrhœa makes its appearance, progressive emaciation sets in, and death usually supervenes in about five days to a week after the first onset of the attack. In a proportion of cases the inflammatory caseous exudate may completely block the throat and windpipe, rapidly causing death by suffocation.

In the chronic form of the disease the local signs are generally first noticed. These have the appearance of a firm cheesy exudate

developing upon the inner surface of the mouth, extending into the gullet and nasal cavities. Occasionally the eyes share in these changes, or may even be the first seat of the disease. The symptoms following this condition can easily be imagined. The affected bird cannot eat, owing to the inflamed state of the mouth and partial blocking of the throat by the newly formed, adhering inflammatory tissue. Breathing is difficult, and is attended by a curious wheezing noise. The bird becomes extremely thin, and suffers from diarrhœa. It may remain alive for weeks or even months, until, as a rule, some acute disorder provoked by malnutrition sets in and finally causes death. Sometimes birds affected in this manner may die suddenly from suffocation, due to obstruction of the nostrils or windpipe by the accumulation of the caseous inflammatory material. Post-mortem examination of a fowl which has died of diphtheria shows the caseous matter referred to deposited along the course of the upper respiratory passages, windpipe, and gullet, often extending down the latter into the crop, the liquid contents of which contain flaky portions of the detached inflammatory product. The chest cavity and air-sacs may also contain more or less of the yellow fibrinous deposit characteristic of this affection. The intestines may also be involved in these changes, and in the acute form, unless death has been due to suffocation following blocking of the windpipe, the spleen, kidneys, and liver are enlarged and congested.

Origin.—Avian diphtheria is caused by a specific micro-organism belonging to a particular type corresponding to what has been described as the *hæmorrhagic septicæmia* group of bacteria or "*pasteurella.*" Cértain cases may be associated with, or are actually due to, an organism which in its microscopical appearance and cultural characters closely resembles the organism of human diphtheria. This type of organism was constantly present in an outbreak which occurred prior to the publication of this article. On account of the similarity of the lesions produced and the frequent presence of this particular type of organism, much controversy has taken place as to the possibility of the transmission of avian diphtheria to man. The best authorities are now agreed that such is not possible, as the organism of avian diphtheria present in these cases differs materially from the human one, notably in its inability to produce the deadly toxin which is responsible for the fatal train of symptoms in the human subject.

An interesting fact in support of this decision is narrated by Guerin,* a French scientist, who states that in certain districts of

* Guerin: *Recueil de Médecine Vétérinaire*, No. 1, 15th January, 1903.

France the breeding of game fowls for cock-fighting is very common among the peasants and workmen. It appears that this breed is particularly susceptible to avian diphtheria, large breeders sometimes losing as many as 40 per cent. of the birds with it.* M. Guerin relates that he has seen some of these fowls severely affected with avian diphtheria kept in the room used by the family for taking meals, and observed the children and others feeding fowls out of the hand that were rendered blind by diphtheria affecting the eyes; but in spite of this and other opportunities of infection he has never seen any evidence that the disease could be transmitted to children. Instances to the contrary have been reported, and more recently Major Holmes,† Imperial Bacteriologist to the Government of India, has recorded an outbreak of diphtheria among European children in India which appeared to be associated with a similar disease affecting certain cows and fowls in the same locality, the organisms isolated from cases in each species being indistinguishable from one another as determined by various cultural and inoculation experiments. No conclusive opinions are expressed by Holmes regarding the actual relationship of the diseases in question, which may, moreover, have occurred coincidently. The weight of available evidence, at any rate, does not support the contention formerly held that avian and human diphtheria are intercommunicable diseases.

Contagion.—Avian diphtheria is conveyed from fowl to fowl by cohabitation and contact. The material soiled by the virulent discharges from the mouth and excreta of affected birds, picked up with the food and swallowed by others, forms a ready means of disseminating the disease. The common drinking-trough also is a potent source of contagion. The eye is frequently infected owing to the habit fowls have of scratching the eyelids with their feet soiled with excrement. All birds are susceptible to attacks, but the condition is seen chiefly among fowls, ducks, parrots, and pigeons. Rabbits and mice easily contract the disease when inoculated with virulent material. It seems probable that some slight scratch or abrasion of the mucous surface of the mouth or other parts primarily attacked is necessary to ensure infection.

Treatment.—In the acute form of avian diphtheria no effective treatment can be applied. In the more chronic forms treatment in the case of valuable birds may be undertaken with some measure

* In the local outbreak the mortality was limited to 5 per cent., probably on account of the preventive measures taken as soon as the nature of the disease became known.

† Holmes, J. D.: *Journal of Comparative Pathology*, No. 1, Vol. xvii, 1904.

of success, provided the disease be localized upon parts easily reached, such as the mouth or eyes. The best means of treatment in such cases consists of the removal of the "false membrane" by carefully detaching it from the mucous surface with the aid of forceps, followed by swabbing the affected parts with some antiseptic and caustic agent, such as 5-per-cent. watery solution of carbolic acid or tincture of iodine. This treatment must be carried out daily until recovery takes place. Practically speaking, prevention should take precedence of any curative measures. This will include the isolation of affected birds and the thorough cleansing and disinfection of the runs, roosts, and all utensils. An entire change of site for the former is advisable. Badly affected birds should be killed and the bodies destroyed by burning. Fresh arrivals should be carefully examined for any appearance of this disease before being placed among the healthy fowls.

CALIFORNIAN THISTLE.

A STRIKING instance of the vital necessity of avoiding the migration of Californian-thistle seed through the channel of feed oats has been provided by an Ohakune settler. A portion of the holding of the settler has been leased to a sawmilling firm for seven years, and therefore not till the end of that time will it be possible to burn part of the section in question, and thence endeavour to solve the question of controlling the weeds upon it. In the meantime the horses and oxen of the milling lessees are being fed on oats infested with Californian-thistle seed. The settler writes as follows:—

"I spent the whole of last summer fighting Californians in the faint hope that I might overtake them. I could hope to get rid of small patches and hoped to keep the larger ones from extending their boundaries; but now that it is so evident how the seeds are being scattered broadcast it seems quite hopeless to battle with them."

A sample of a line of oats being sold in the district for feed purposes was examined by the Biologist of the Department, Mr. A. H. Cockayne. It contained large quantities of mature Californian-seed heads. A germination test, to determine the fertility of these seeds, showed that nearly 50 per cent. germinated within ten days. The significance of using such weed-laden oats need hardly be emphasized.

LUCERNE.

LUCERNE is being planted on an extensive scale at the Weraroa Experimental Farm this season, 20 acres of land now being prepared for the purpose. The lucerne-fields are also being extended at the Moumahaki Experimental Farm, in order to test exhaustively the value of the plant for grazing purposes and the conditions under which this may be done to the best advantage. Fully 15 additional acres will be sown down to the plant at Moumahaki this year. The demonstration-work in lucerne at the Ruakura Farm of Instruction is also being extended. A large area of land is also being prepared for the planting of lucerne in 1914. It is generally conceded that if a successful stand of lucerne is to be secured preparation for it should be made in the preceding season. The best means of doing this is to plant in a well-cultivated soil a cover-crop, to weaken the weed-growth and provide the essential clean seed-bed. For this purpose a legume is to be preferred, such as tares, peas, or crimson clover. Rape is also useful. The same may be said of mustard, if followed by careful cultivation. Roots, well grown and kept thoroughly clean, are also valuable preparatory crops.

The lucerne-fields at Ruakura are attracting very great attention, principally by reason of the fact that the plant is growing on what was at one time considered most unsuitable soil for such a plant to thrive in. Judging by Ruakura experience it appears that lucerne would be successful in almost any description of soil, providing the land is not saturated with water.

The Department is again offering to farmers seed, lime, and inoculated soil, in order to enable them to test lucerne in their localities, and thereby to bring about more general utilization of a plant that is apparently inseparable from the best results being obtained by the dairy-farmer and the grazier.

The results from lucerne-growing have been varied, and it would appear that the average farmer has not yet come to realize the necessity of doing sufficient work to keep the crop clean in the winter, especially in a climate like that of the west coast of the North Island, where grass and weeds grow all the winter while the lucerne is dormant.—*J. W. Deem (Wanganui).*

A RUAKURA EXPERIMENT

TO DETERMINE RESULTS WHEN THE SAME FERTILIZER, OR MIXTURE OF FERTILIZERS, IS APPLIED TO THE SAME PLOTS FOR SEVERAL YEARS IN SUCCESSION.

PRIMROSE McCONNELL.

IT has always seemed to the writer that the ordinary system of manurial experiments, except on land that has not previously been manured, or that has not been manured for some years previous to the experiments, are to some extent unsatisfactory, because those experiments must be influenced by previous manurial treatment, and under the ordinary system we have no means of determining the results of applying the same manures for a succession of years. Such an experiment as the above must be of very great value if carried out for a number of years, but it cannot be too strongly emphasized that the results of this, the first year of the experiment, must not be looked upon as an infallible guide to those who are farming similar soil, although some of the results were confidently expected by the writer.

The field devoted to this purpose grew a crop of mangels the previous year, and although swedes after mangels may not be considered a correct rotation, yet the observant practical farmer has long ago proved that, on land subject to root-diseases, swedes following mangels were always freer from disease than after any other crop; and the success of the swedes in this instance and their freedom from disease is a further proof of this contention. The plots are half an acre in extent, with a space of 4 ft. between each, the outside plots being 12 ft. from the hedge-rows. Crossing all the plots is a dressing of carbonate of lime, 10 yards in width (20 cwt. per acre), which brings the total experiments to the number of fifty-four. For this first season the results of liming have been negative, and need not be taken into consideration.

The preparation of the soil received more attention than usual, as the field was much infested with couch, and required special cultivating for cleaning purposes. The procedure was as follows:—

June: Ploughed with digger 7 in. deep, cultivated, and weeds gathered off.

September: Cross-ploughed with disc plough, and tine-harrowed.

October: Disced, tine-harrowed, chain-harrowed, and weeds gathered off.

December: Cultivated, tine-harrowed, chain-harrowed, weeds gathered off, and the land rolled.

December 30 to January 2: Turnip-seed and manures sown with the double ridger in rows 27 in. apart, the plants being afterwards singled out to from 9 in. to 12 in. apart in the rows, which were four times horse-hoed during the season. All the plots were sown with the same variety of seed.

Sulphur, which is being experimented with for the first time on this station, has given good results. Wherever applied the germination has been excellent, and much superior to that on any of the other plots; also, the plants all through the season have been more vigorous, the dark green of the foliage being visible from a distance. How this result has been brought about is not clear, but on this land sulphur may be a lacking element of plant-food, or it may act as a sterilizer with beneficial results. Reports are coming to hand from different parts of the world, and in any instance where sulphur has been applied it has been successful not only in giving an increased yield, but also in producing a crop much healthier than those grown under ordinary conditions.

Experiments made by Mr. M. E. Boullanger, which were reported in the "Comptes Rendus," and summarized in "Die Gartenweldt" (xvi, 17, page 228), tend to show that the application of small quantities of flowers of sulphur to the soil results in a very considerable increase of the crops grown in that soil. As a result of the addition of 7 decigrams of flowers of sulphur to 30 kilograms of soil, the plants experimented with—beet, beans, celery, potatoes, spinach, and others—gave a higher yield of produce than the control plants grown in unsulphured soil.

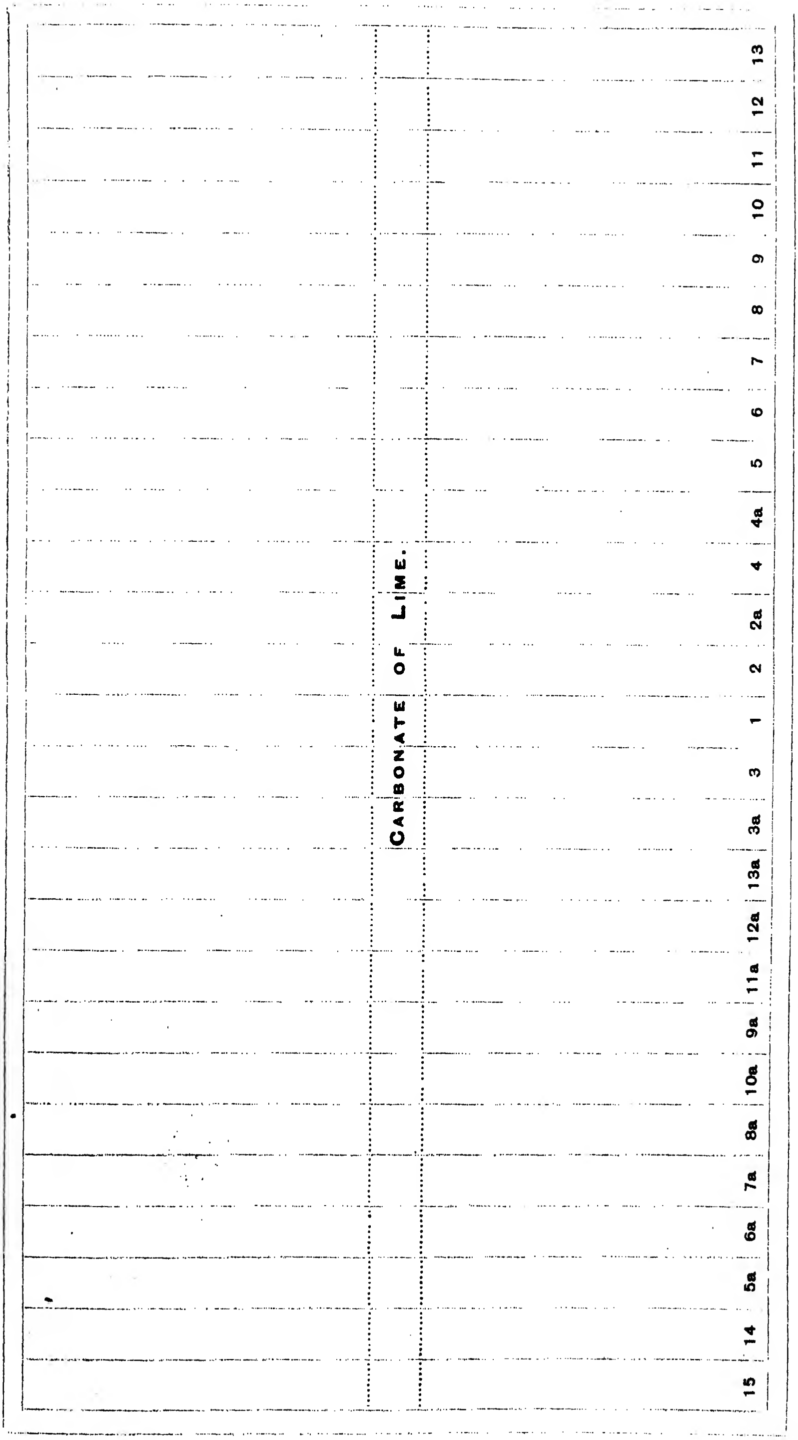
Nor is that all. According to M. Boullanger the yield from the soil treated with sulphur, but otherwise unmanured, was actually greater than that from soil which received a complete manure. When both complete manure and sulphur were added the best results of all were obtained. One example will suffice to show the extent to which sulphuring the soil increased its fertility. The numbers given represent the result in grams in the case of celery:—

No Manure.	Sulphur.	Complete Manure.	Complete Manure and Sulphur.
60	635	398	676

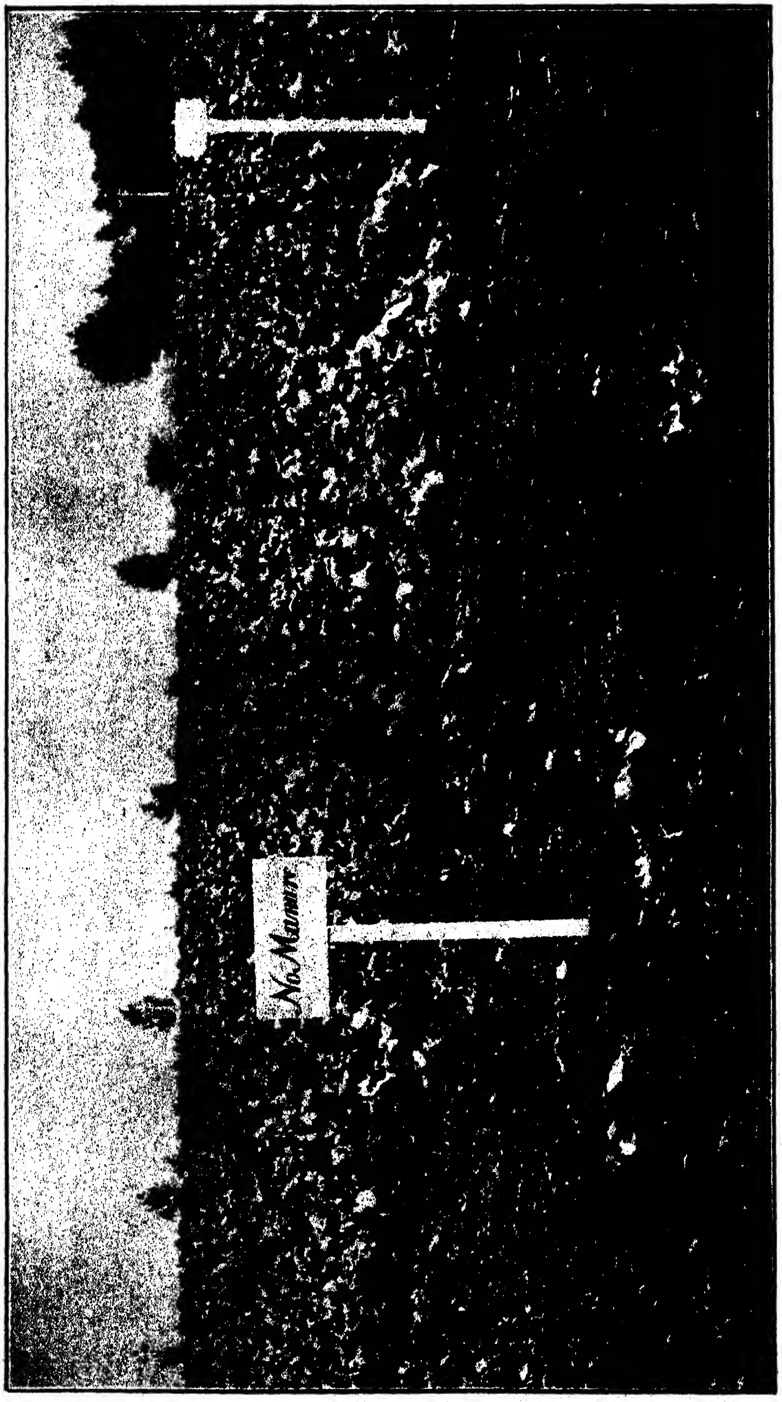
The article also states that "if further experiments confirm M. Boullanger's experiments we shall have to add flowers of sulphur to the list of artificial fertilizers."

The following table gives the results of the Ruakura experiments. One-sixtieth of an acre was weighed from each plot.

Plot.	Fertilizer per Acre, in Pounds.		Cost per Acre.		Yield per Acre.		Total Gain by Manuring, Roots and Tops.	Cost of Gain per Ton.	
					Roots.	Tops.			
			s.	d.	Tons.	Tons.	Tons.	s.	d.
1	No manure ..		..		2·5	0·3	..	..	
2	Basic slag	424	20	3	30·6	3·5	31·3	0	8
	Kainit	106							
2A	Basic slag	884	42	0	34·0	4·7	35·9	1	2
	Kainit	216							
3	Superphosphate ..	448	21	6	28·6	4·7	30·5	0	8¼
	Kainit	112							
3A	Superphosphate ..	896	43	0	27·3	5·0	29·5	1	5½
	Kainit	224							
4	Basic superphosphate	212	21	9	36·3	4·9	38·4	0	6½
	Seychelles Is. guano ..	212							
	Kainit	106							
4A	Basic slag	448	44	9	35·7	5·6	38·5	1	2
	Seychelles Is. guano ..	448							
	Kainit	224							
5	Malden Is. guano ..	554	31	6	36·0	5·0	38·2	0	10
	Kainit	112							
5A	Malden Is. guano ..	560	28	0	41·2	5·5	43·9	0	7½
6	Basic superphosphate	448	28	6	38·5	4·6	40·3	0	8½
	Sulphur	112							
6A	Basic superphosphate	420	26	0	37·7	4·0	38·9	0	8
	Sulphur	98							
7	Basic superphosphate	392	19	9	32·5	4·7	34·4	0	7
	Kainit	98							
7A	Basic superphosphate	416	21	6	34·7	4·0	35·9	0	7
	Kainit	104							
8	Basic superphosphate	392	30	9	29·0	3·9	30·1	1	0
	Kainit	84							
	Nitrate of soda ..	84							
8A	Basic superphosphate	404	33	3	27·4	4·0	28·6	1	2
	Kainit	98							
	Nitrate of soda ..	98							
9	Blood and bone ..	448	29	0	25·7	3·0	25·9	1	1½
9A	Blood and bone ..	484	31	3	25·4	3·2	25·8	1	2½
10	Bonedust	212	23	6	40·0	5·6	42·8	0	6½
	Superphosphate ..	212							
10A	Bonedust	224	24	9	40·8	5·5	43·5	0	7
	Superphosphate ..	224							
11	Bonedust	212	25	9	28·5	3·6	29·3	0	10½
	Superphosphate ..	212							
	Kainit	106							
11A	Bonedust	224	28	0	29·7	4·0	30·9	0	10¾
	Superphosphate ..	224							
	Kainit	112							
12	Superphosphate ..	404	24	6	30·3	4·8	32·3	0	9
	Sulphur	100							
12A	Superphosphate ..	448	27	6	32·0	4·7	33·9	0	9¾
	Sulphur	112							
13	Seychelles Is. guano ..	404	26	0	37·1	5·5	39·8	0	7¾
	Sulphur	100							
13A	Seychelles Is. guano ..	448	29	0	39·0	5·2	41·4	0	8⅜
	Sulphur	112							
14	Basic slag	424	27	9	36·0	5·2	38·4	0	9
	Sulphur	106							
15	Basic slag	312	19	3	30·8	4·8	32·8	0	7
	Basic superphosphate	202							



SKETCH OF SWEDE-EXPERIMENT PLOTS, RUAKURA FARM OF INSTRUCTION.



THE NO-MANURE PLOT SHOWN IN COMPARISON WITH THE BASIC-SLAG-AND-KAINIT PLOT IN THE RUAKURA EXPERIMENTS.

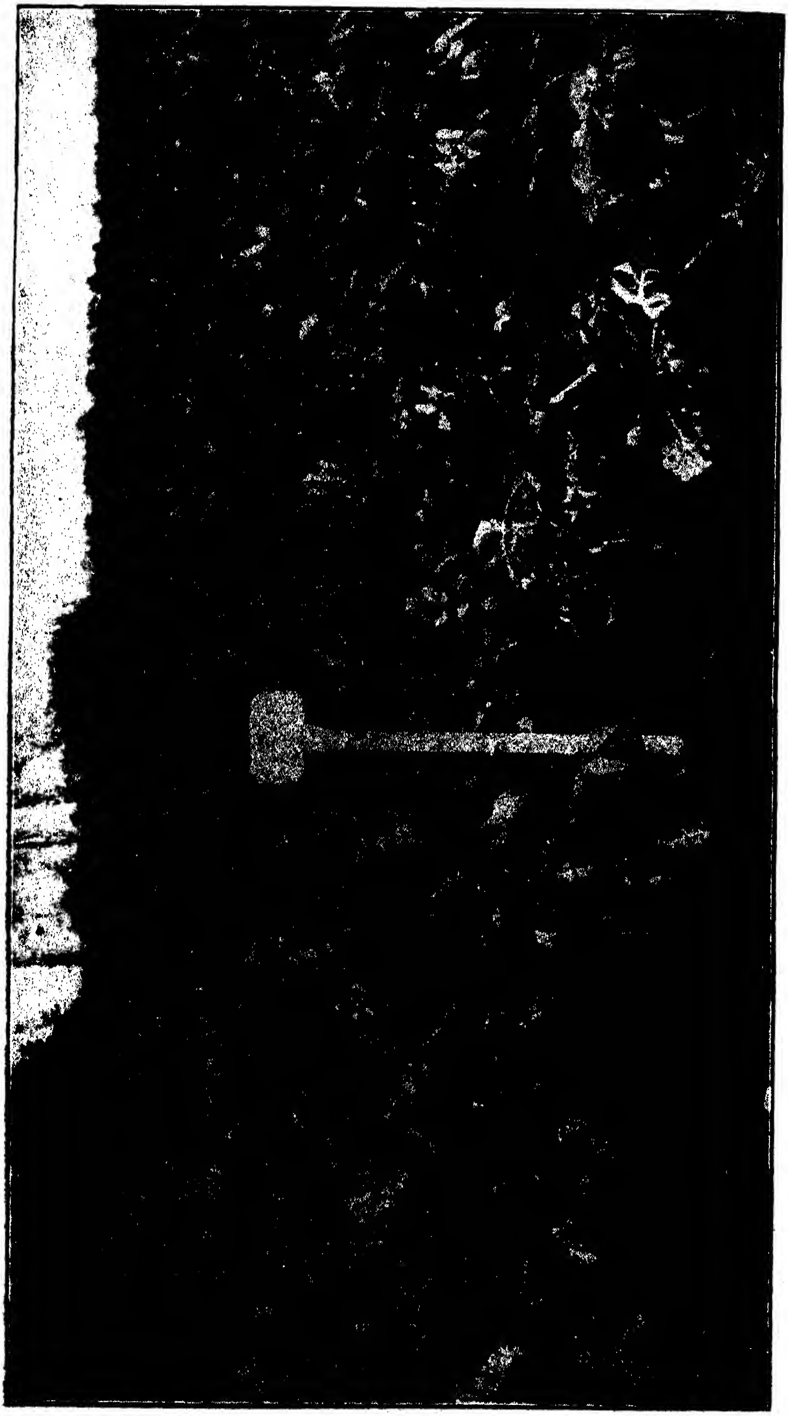
Summarizing the above results, it must be concluded that the superphosphate-and-bone mixture is the most profitable in this instance; and it is very patent that highly nitrogenous manures have been of comparatively little value—in fact, in the case of nitrate of soda it has been applied at a dead loss. It will be noticed that the majority of the plots are duplicated (not side by side, except as in the case of double and ordinary dressings, but at different portions of the paddock) so as to eliminate the effect caused by variance of soil; yet the results from such duplicate plots are very consistent.

In every instance where kainit was applied in conjunction with a phosphatic manure the yield is less than when the latter was applied alone. This may to some extent be accounted for by the fact that when the seeds and manures were sown there was not sufficient moisture in the soil to dissolve the injurious salts in the kainit, resulting in an injury to the germination; and it is a well-known fact that potassic manures are better applied some time previous to the sowing of the seed. It will also be noticed that the basic-superphosphate-and-sulphur and the basic-slag-and-sulphur plots have given a greater yield than the basic-slag-and-kainit or basic-slag-and-basic-superphosphate plots. The addition of sulphur has, however, considerably increased the cost, and it seems strange that sulphur should be so dear in a country where it is so plentiful.

The germination of plots 2, 2A, 3, 3A, 7, 7A, 8, 11, 11A, and the blood-and-bone plot were so bad that they had to be resown on the 13th January. In comparing the double and ordinary dressings it will be noticed that 5 cwt. superphosphate and kainit gave a greater yield than 10 cwt., the same applying to plots 4 and 4A; and in the case of the slag and kainit (plots 2 and 2A) the 10 cwt. dressing yielded only 3·4 tons more than the 5 cwt. dressing. The no-manure plot speaks for itself, and can be described only as a miserable failure.

It is intended to sow the next crop (oats) without manure, so as to prove which has left the greatest residue behind after growing the swede crop, and the double dressing may then prove profitable. Southern readers are requested to bear in mind that this naturally is very poor soil, as is evidenced by the result from the no-manure plot.

Taking the dry season into consideration, the whole crop was a very satisfactory one. In order to test their keeping-qualities a number of roots from each plot have been stored, and the results will be reported later.



No. 6A PLOT.—MANURED WITH 420 LB. OF BASIC SUPERPHOSPHATE AND 98 LB. OF SULPHUR PER ACRE.

Eighty bullocks have been fattened on this crop at an average gross profit of nearly £5 per head. A number of sheep have also been fed. All the swedes have been carted off. To turn stock on the crop would have spoiled the experiment, as it is quite safe to conclude that they would have dropped their excrement more on one portion of the paddock than the other, and thus render the future fertilizer experiments of little value. As far as I am aware, Rothamstead is the only other station where similar experiments have been carried out.

Writing to the Department under date of 24th July, Messrs. F. H. Brunning Proprietary (Limited), seed-merchants, Melbourne, Victoria, say, "Owing to the articles we have read in your different *Journals* in the past we anticipated a heavy demand for silver-beet seed, and accordingly laid in a large stock, from ten to twelve times more than we have ever imported in the past; and, although the new seed only arrived some four weeks back, we are now entirely sold out. This is due to the efforts of your Department."

CHEWING'S FESCUE.—Some buyers will not buy [New Zealand] seed at all on c.i.f. terms, preferring to wait until some lots are landed here and have been tested for growth, having lost a considerable amount of money owing to last season's seed showing very bad growth on arrival here. Many complaints have been received that the seed was not bulked before shipment. It was found that, when tested, seeds varied considerably in growth, one bag being as low as 38 per cent., while another showed a growth of 96 per cent. It is necessary in future that shippers take great care to see that all shipments of Chewing's fescue as well as other grasses and clovers are thoroughly bulked before shipment, otherwise trade in future will be very difficult.—*Extract from letter received from prominent Mark Lane (London) Merchant.*

FEEDING MAIZE TO A DAIRY HERD IN CANTERBURY.

LANDSCAPE GARDENING.

LAYING DOWN AND MAINTAINING LAWNS.

J. A. CAMPBELL.

As a means of beautifying and improving the surroundings of the homestead, landscape gardening is, it is gratifying to know, receiving more attention now than in the past, but there is still vast room for improvement in this direction. It should be the aim of every householder, where possible, to do something by way of ornamenting the grounds in connection with his residence corresponding with the extent of the land available. Neatly kept lawns, flower-beds, and shrubbery borders, &c., not only improve the appearance of the property, but make the home more attractive and pleasing to the occupiers. To a great extent the laying-out of grounds must of necessity be controlled by the extent of the land available, situation, lay of the country, &c.

There can be no rule-of-thumb method laid down in reference to general landscape work, as different positions invariably require special treatment and design, but in dealing with small areas it is always advisable to aim at neatness and simplicity. With regard to work on a large scale, probably the two main points to observe in designing the work are: when the surrounding country is rough and rugged the ground should be treated as artificially as possible —neat level lawns, walks, flower-beds, borders, &c., should be aimed at in order to form a contrast; on the other hand, should the surroundings be made up of neatly laid-out and well-kept green fields, &c., more natural ruggedness may be introduced. However, it is not the object of this article to discuss design, but mainly to illustrate as briefly as possible the proper method of carrying out the work.

PLAN OF THE WORK.

Before commencing the actual work of laying out the grounds, whether they be large or small, the whole design should be first committed to paper in the form of a plan carefully drawn to scale. There are many reasons in favour of a plan. The work can be confidently undertaken without the danger of loss of time and

labour through alterations having to be made after the work is under way. If the design be unsuitable, it is easier to alter the plans at the outset than it is to alter the work later on. Paths and drives should be clearly defined in the first place, and unless the surface soil from these is required for another part of the ground it should not be disturbed, as this not only means extra labour in trenching but also in consolidating the foundation again. All that is necessary is to skim off the turf to a depth sufficient to allow for metal or asphalt.

Levels.

When the grounds being dealt with are lying in such a way that ordinary level work is necessary, the next step is to have the levels taken and a sufficient number of pegs driven into the ground to work by, always aiming to have, where possible, a grade away from the buildings. A grade of 2 in. or 3 in. to the chain not only improves the appearance of the work, but provides a ready means of drainage for storm-water. Where this is not possible a more elaborate system of drainage will be necessary.

Trenching.

After the plan has been decided upon and the levels taken, the preparation of the soil should be commenced by opening up a trench along one side of the work about 2 ft. wide and one spade deep. The soil from this trench may be deposited in any low-lying part of the grounds where it can be used up or placed on the opposite side of the work. It will then be available for filling up the last trench. Break up the subsoil well in the bottom of the trench; mark out a second trench similar to the first; skim off the turf and place it grass downwards in the open trench. Now place the soil from a second trench on top of the turf in the open trench, keeping the best soil to the top and building it up to the top of the level-pegs. Break up the subsoil in the bottom of the second trench, and so on, repeating this until the whole of the ground has been worked. In opening up the first trench the lay of the ground should be taken into consideration. If one side of the ground be lying high and the other low, the trench should be opened up in such a manner as will take in both the high and the low sides, so that, in the working, the surplus soil from the high end of the trench can be used to make up the slackness in the low end. When working the ground care should be taken to pick out the roots of

all such weeds as docks, dandelions, &c. To do this thoroughly may be slow work, but it will pay for the doing in the saving in labour in weeding the lawn later.

MARKING OUT BORDERS, ETC.

After the ground has been trenched the outer borders should be roughly marked out. Flower-beds, &c., on the main lawns should be left until after the levelling and rolling has been completed, as breaks of this kind interfere with the levelling operations.

TREADING OR HEELING.

This is a very necessary operation in order to consolidate the soil, especially in preventing pockets and potholes which are always present in the digging, although they may not be noticeable until after the treading has been done. A roller is not satisfactory for this purpose, as it is too wide in the surface to consolidate the pot-holes. If a roller alone be depended upon the slack places are sooner or later bound to sink and the surface of the lawn will become very uneven. Treading or heeling the lawn means that the lawn must be systematically trodden down, mainly with the heels. Commence, say, at the left corner, face outward; now take short side steps of about 3 in. to the right, at the same time throwing the weight of the body mainly on the right and left heel alternately. Continue in this way to the right until the opposite side of the lawn is reached, return in the same manner, but working to the left, and taking in a fresh strip of about 3 in. of dug soil. Continue this until the whole of the ground has been covered excepting the borders previously marked out. Do not disturb the level-pegs. Next build up and tread solidly the edges of the drive and walks, allowing for a few inches of soil to be cut away later, in order to leave a clean-cut solid edge.

LEVELLING.

Rake over the whole work to a uniform level, using the level-pegs as a guide, filling up all slack parts and potholes, which will be numerous after the treading, with the soil raked from the higher parts. Roll the whole twice with a roller of about 3 cwt. in weight. The second rolling should be done in an opposite direction to or across the first. Rake level once more and remove level-pegs. This should be sufficient for ordinary lawn-work, but if a special lawn be required another rolling and levelling will be necessary.

Marking out and cutting Verges.

Now mark out accurately, according to the plan, all borders, flower-beds, walks, and drive. Cut the edges or verges of these with a batter of about 1 to 2, using for the purpose a tool known as an edging-knife. This implement has a crescent-shape blade with a handle like the ordinary spade. All sweeps, curves, circles, &c., must be cut perfectly true. Avoid deep verges. When a flower-bed or border is finished off and planted it should show a neatly cut verge of not more than 1½ in., walks 2 in., and drives from 2½ in. to 3 in. Neatly cut verges in the natural soil are always preferable in private gardens to fancy tiles, cement, or timber.

Sowing the Seed.

To ensure a good take of grass up to the verges it is necessary to make a shallow groove around all the edges and as close to the verges as possible. Sow seed fairly heavily in these grooves, and then with the back of the rake refill them with soil, tramping it down to the level of the lawn. Now sow the seed broadcast, but as evenly as possible, over all the lawn, and rake it in. When covering the seed avoid raking the soil into small hillocks, but endeavour to leave the surface perfectly level. I favour a good heavy sowing of seed as being the most satisfactory and economical in the end—say, from 80 lb. to 100 lb. per acre. In many localities a fertilizer composed of equal parts of superphosphate and bonedust should be sown with the grass-seed.

Season for Sowing.

Sow during the months of February, March, April, August, September, or October. Autumn-sown lawns often give more satisfaction than those sown in the spring owing to the grass having a longer time to become established before having to undergo a summer's drought, although spring-sown lawns usually do very well.

Maintenance.

The young grass should be cut and rolled when it has made about 3 in. of growth. The cutting should be repeated at intervals, according to the growth made, until the grass becomes fairly well established, and from then onward it should be cut once a week unless it be a spring-sown lawn. In that case it may be advisable not to cut too severely during the first summer, unless there be

plenty of water available to keep the soil moist. In the meantime the lawn should be rolled occasionally with a good heavy roller and all weeds and foreign grasses removed. After the first cutting of the grass all the verges should be recut. Afterwards these will only require attention occasionally. After every subsequent cutting of the grass all growth overgrowing the verges should be cut back neatly with a pair of hand-shears. During the first season or two an occasional top-dressing of finely sifted soil with a little fertilizer added may be necessary. After the grass is properly established very little fertilizing should be needed so long as proper attention is given to cutting, rolling, and watering. An established lawn should be cut at least once a week or oftener during the growing season and thoroughly rolled at least once a month. Rolling is beneficial in keeping the surface of the lawn in good order and the grass-roots well embedded into the soil, and assists considerably in controlling the grass-grub. It is hardly necessary to state that the lawn should not be rolled in wet weather.

LAWN-MOWERS.

The appearance of a lawn depends to a great extent upon the class of lawn-mower used. There are several makes of side-driven machines on the market. These are light and cheap, and are therefor in general use; but, generally speaking, this class of machine is dear at any price. They do not make a good job of cutting the grass, and it is next to impossible to finish off the edges tidily with them. Unless a considerable amount of finishing-off be done with hand-shears, lawns cut with these machines are always untidy around the verges, so much so that in many cases all interest is lost and the lawns are entirely neglected. Roller-driven machines, although heavier and dearer, last longer and give far more satisfaction. They not only cut close and well, but the machine, owing to the roller, can be driven with the knives overlapping the verges by several inches, and thus making a clean, neat finish. For large areas motor or horse machines should be used.

LAWN-GRASS SEED.

The rye is recommended mainly as a cover for the finer grasses. White clover may be added to the following mixture for general lawn-work, but for a special lawn the rye and clover may be left out: Rye (English), 20 lb.; *Poa pratensis*, 20 lb.; Chewing's fescue, 20 lb.; *Poa nemoralis*, 16 lb.; crested dogstail, 12 lb.; fiorin, 12 lb.

MILK-TESTING.

THE GERBER METHOD.

W. E. Gwillim.

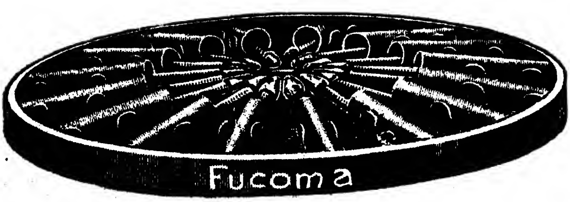
There is probably no other country in the world where the testing of milk for its butter-fat content is in such general use as is the case in New Zealand. It is to the credit of the dairying community of the Dominion that the payment for milk on a butter-fat basis in connection with the manufacture both of butter and of cheese was here first generally applied. Now that interest in milk-testing is reaching beyond the butter and the cheese factory by reason of the rapidly increasing interest in herd-testing work, a natural inquiry has been created as to the different methods of securing the desired information. Hence it is that the Gerber system—the method generally in vogue in Europe and the United Kingdom—is claiming attention. To meet the demand for some detailed knowledge on the subject, based on local experience, this article has been prepared.

The Gerber System.

The system is very similar to the Babcock system, and is for the same purpose—namely, for making an inexpensive, accurate, and quick determination of the fat-content of milk and milk-products. In both systems specially designed centrifugal machines and glassware are used, and the amount of fat is read off volumetrically.

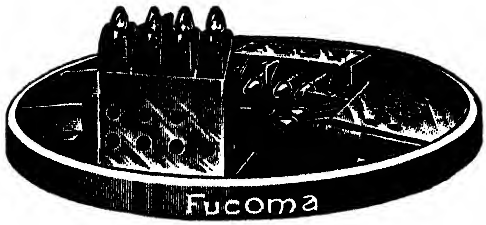
Babcock and Gerber Systems compared.

The chief points of difference between the two methods are worthy of note. In the Babcock system one reagent—sulphuric acid—is used to dissolve the non-fatty constituents of the milk and to liberate the fat, and the test is completed after three whirlings in the centrifuge, hot water being added



Bottle-carrier of Gerber "Original" System.

to the testing-bottle between the intervals of whirlings. In the Gerber system, however, two reagents—sulphuric acid and amyl alcohol—are used, and the test is completed without the addition of hot water and with only one whirling in the centrifuge; also, smaller quantities of milk and sulphuric acid are required.



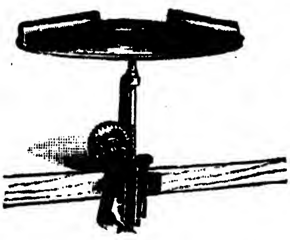
Bottle-carrier of Gerber "Fucoma" (Pocket) System.

The Use of Amyl Alcohol.

The object in using amyl alcohol is to prevent possible charring of some of the fat and milk-sugar and the subsequent appearance of charred matter in the form of black specks in the fat-column, which sometimes happens when only sulphuric acid is used.

The Babcock System first in the Field.

The Gerber system was devised by Dr. Gerber, a Swiss chemist, and was introduced about wo years after Dr. S. M. Babcock's invention. It came to New Zealand about the year 1894, and has been in use since that time to a limited extent. Up to the advent of the Gerber the Babcock system had been the means whereby the principle of paying for milk according to butter-fat content for the manufacture of butter and cheese was first established amongst our dairy-factory concerns. Knowledge of the system and the method of operating it soon spread, with a result that ample supplies of Babcock testing-apparatus were kept available to meet all likely demands for a practical method of ascertaining the fat-content of milk. These are, perhaps, the chief reasons why more general notice was not given to the Gerber system. It cannot be said that the Gerber system was side-tracked on account of any demerit of its own. It is the system most generally employed in the United Kingdom and on the Continent of Europe, and it is to be found in use wherever dairying is carried on.



Two-bottle Hand-power Gerber Tester.

The Gerber "Original" and "Fucoma" Systems.

Testing-outfits are made in two styles, and are called (1) the "original" system, and (2) the "Fucoma" (pocket) system. The

only practical difference between them is that in the Fucoma system one-half the quantity of milk and of chemicals is used.

CLEARER TESTS BY THE GERBER SYSTEM.

On various occasions during the past dairy season the writer has operated a small hand-power machine and a thirty-six-bottle steam turbine machine of the "original" system, and has also tested duplicates of the samples of milk simultaneously by the Babcock system. The experience has been that, in addition to a saving of time and materials, clearer readings of the fat were obtained by the Gerber system. The Gerber system well deserves the attention of those whose business it is to test milk for its content of fat.

GERBER MILK-TESTING APPARATUS.

The apparatus of the "original" system consists of (1) the centrifuge, and (2) glassware and appliances of the following description :—

(*a*.) Butyrometer (or milk-testing bottle), graduated generally from 6 per cent. to 9 per cent. in divisions of 1 per cent., each subdivided to 0·1 of 1 per cent., and fitted with a rubber stopper.

(*b*.) Three pipettes, one each for measuring respectively 11 c.c. of milk, 10 c.c. of sulphuric acid, and 1 c.c. of amyl alcohol.

(*c*.) Rack for holding glassware.

(*d*.) Thermometer.

(*e*.) Tin bath for holding hot water, and fitted with rack to take butyrometers and thermometer.

(*f*.) Spirit-lamp for use with bath.

(*g*.) Brushes for cleaning glassware.

The chemicals required are—

(1.) Sulphuric acid of a specific gravity of 1·820 to 1·825 at 60° F.: the higher strength for winter use.

(2.) Amyl alcohol of a specific gravity of 0·815 to 0·818 at 60° F., boiling at 263° to 266° F. It should be colourless, clear, and free of all fatty and resinous matter.

Measures, other than pipettes, for the acid and alcohol are made in the form of burettes, &c., and hydrometers for testing the specific gravity of the chemicals are procurable. The correct quality of chemicals can be obtained from reputable dealers.

How to sample Milk.

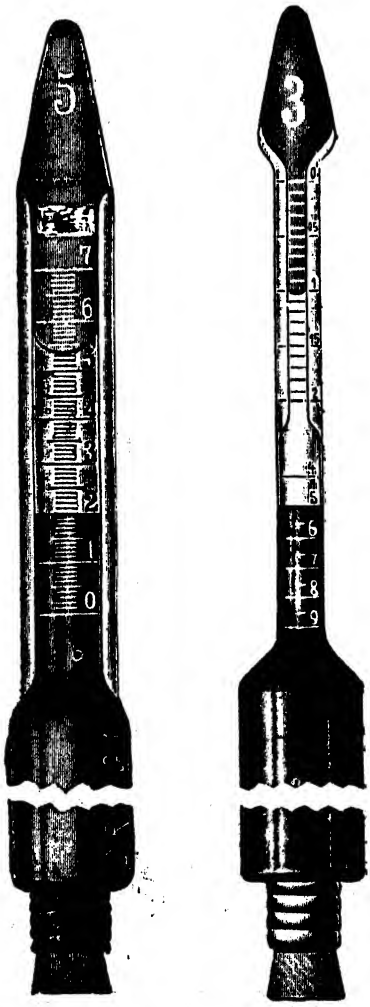
For the purpose of ascertaining the fat-content of milk, it is imperative that the condition of the milk be such as will permit of taking a sample which is representative of the whole. The distribution of the constituents becomes uneven when milk is allowed to stand. Therefore, before sampling, it should be agitated with a plunger or by pouring from the vessel containing it into another, and, as the agitation subsides, the sample should be dipped out with a cup or small sampling-dipper. About 1 oz. of milk is generally enough to take as a sample.

Preserving Milk-samples.

Milk-samples may be kept sweet and fluid by the use of such preservatives as formalin, powdered bichromate of potash (or in form of tablets), and a mixture of one part of corrosive sublimate and three parts of bichromate of potash. Four to eight drops of formalin and a half-gram or eight grains of either powder will preserve milk-samples for any period up to fourteen days. The small amount of preservative used makes no appreciable difference in the amount of fat shown by the test.

Preparing the Milk-sample for Testing.

The milk-sample, at a temperature of 60° to 65° F., which shows no separated cream should be poured into another vessel and back again. This gives a good mixing. The quantity for testing should then be taken out. The milk-sample in which cream has separated (composite samples at dairy factories are generally in this condition) should be



(1) (2)

(1) "Original" system flat-sided Butyrometer for whole milk.

(2) "Original" system flat-sided Butyrometer, "Precision" pattern, for separated milk.

warmed to 85° or 100° F. and the cream stirred back into the milk with a small hair-brush, then cooled down to 60° or 65° F., and afterwards poured into another vessel and back again, and the quantity for testing withdrawn at once.

Instructions for making the Test.

The sample of milk should be representative of the whole, and be at a temperature of 60° to 65° F.

To test:—

First measure 10 c.c. of sulphuric acid into the butyrometer.

Next add 1 c.c. of amyl alcohol.

Then add 11 c.c. of milk.

Place the rubber stopper in the neck of the butyrometer and screw in until about an eighth of an inch extends beyond the bottom of the neck.

Then shake the butyrometer well, keeping the thumb on the stopper to hold it in its place.

When the milk in the bulb is all dissolved, turn the butyrometer upside down two or three times.

It is now ready for the centrifuge.

Place in the machine and whirl at a speed of 800 to 1,000 revolutions per minute for three minutes, the lower speed for the large machines.

Remove from machine and place in bath of hot water at a temperature of 140° to 160° F. for two minutes. The test is then completed and ready for reading.

To read: Hold the butyrometer upright in the left hand towards a good light, and turn the stopper inward with the right hand until the bottom of the fat-column is level with the zero or one of the percentage marks of the graduations. Then read the graduated space occupied by the fat from the bottom of the fat-column to the bottom of the meniscus or curve at the top. This represents the percentage of fat.

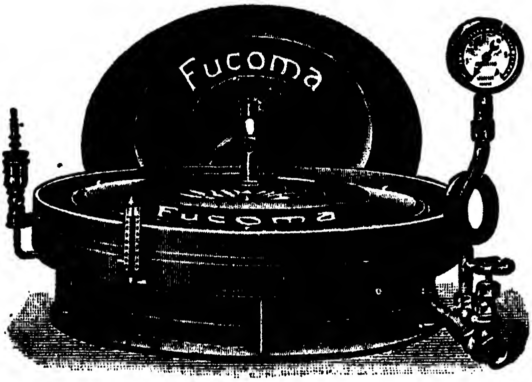
Some Notes on the Work of Testing.

Adding Sulphuric Acid.—Do not let any acid touch the neck of the butyrometer, or the stopper will not hold.

Adding Amyl Alcohol.—Allow this to flow slowly down the inner side of the butyrometer so that it floats on top of the acid and does not mix with it. If dropped on the acid or allowed to remain on it for a lengthy period—say, ten to fifteen minutes—it becomes brown, and this will prevent good results. Amyl alcohol in bulk

should be kept protected from light and well corked, otherwise it will discolour and deteriorate.

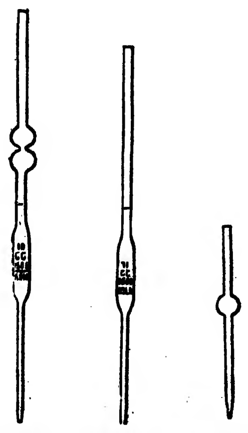
Adding the Milk.—Milk may be added drop by drop or by allowing it to flow slowly down the inner side of the butyrometer. Hold both butyrometer and pipette in a slanting position. The order of adding the amyl alcohol and milk may be reversed if desired.



STEAM TURBINE GERBER TESTER.

Emptying Pipettes.—Allow each to empty slowly. Do not blow into pipettes to force contents out. The end of the pipettes should be lightly tapped against inside of butyrometer, and as much as possible of the last of the liquid got out in this way. Allowance is made in the graduations of the glassware for the very small quantity which adheres to the side of pipettes.

Rubber Stoppers should be dry, free of cracks, soft and pliable. Immediately after use they should be dipped into warm water in which a liberal quantity of washing-soda has been dissolved, then rinsed and wiped dry with a cloth. Neglect of this will cause the stoppers soon to become unfit for use.



PIPETTES FOR GERBER "ORIGINAL" SYSTEM.

Shaking the Butyrometer.—Where a number of tests are to be done it is the best practice to add the chemicals and milk one after the other, and to stopper up the butyrometer without loss of time. When sufficient butyrometers have been filled to make a complement for the centrifuge, the lot can be shaken in a rack (one fitted with copper hood for preference) and the machining proceeded with. When shaking butyrometer by hand, the tester should hold the stoppered end away from him. If too hot to hold, use a piece of flannel to protect the hand. If testing in a room with temperature much below 65° F., or if machining be

delayed and the butyrometers cool, place them before machining in a bath of hot water at 140° to 160° F. for two minutes.

Reading the Fat.—Should the reading of the graduations strain the eyesight, use a small hand magnifying-glass. Dividers are unnecessary. Immersion of the butyrometers in hot water prior to reading the fat can be dispensed with in hot weather or when taken hot out of the centrifuge.

Testing Skimmed Milk, Buttermilk, and Whey.—These are tested in the same manner as whole milk except that, owing to the small fat-content, a butyrometer graduated to 0·01 per cent. is used, and the butyrometer is whirled twice in the centrifuge, and between whirlings is held in the hot-water bath for two minutes.

Testing Samples of Sour Milk.—Use a little soda to redissolve the casein, and test as in the case of sweet milk. Handle the butyrometer with extra care, and directly after shaking remove the stopper to liberate the excessive gas, and then replace stopper. Test in duplicate.

Testing Samples of slightly churned Milk.—Slightly churned samples should be warmed to 100° or 110° F. and vigorously shaken, and the quantity for testing quickly taken with the pipette, and the milk cooled in the pipette. Test in duplicate.

Unsatisfactory Tests.—If the fat-column be not clear and fluid or be in any way unsatisfactory, it is the result of the instructions not being carried out properly.

Cleaning Glassware.—The glassware is quickly and easily cleaned with a solution of soda, soap, and warm water. Shake the butyrometer to dislodge sediment, then empty and rinse. Brush inside with small hair brush when washing.

Amyl Alcohol in Babcock System.—Some operators of the Babcock test have tried to obtain clearer fat-readings by the use of amyl alcohol and failed. Failure was due probably to some of the materials being of too high a temperature and to the chemicals being violently blown into the milk, with the result that some of the milk was charred by the sulphuric acid.

Babcock Centrifuge and Gerber Glassware.—In some dairy factories the Babcock system has been discarded in favour of the Gerber, and the alteration has been effected by obtaining a supply of Gerber glassware and minor appliances and replacing the bottle-carrier of the Babcock centrifuge with one of the Gerber pattern.

Price of Gerber Outfits.—The quality of the Gerber appliances is excellent. Complete outfits appear to cost from 30 to 50 per cent. more than the Babcock, the glassware being about double the price.

The butyrometer should be flat-sided. The old-style butyrometer is round in the graduated part, and is not so easy to read.

Cost for Chemicals for Gerber and Babcock Systems.—To make 1,000 tests by the Gerber "original" system requires 1 litre or 1,000 c.c. of amyl alcohol, which costs about 12s. 6d.; and 10,000 c.c., or about 40 lb. of sulphuric acid, at, say, 2½d. per pound, amounts to 8s. 4d.—a total of £1 0s. 10d. By the Babcock system 1,000 tests require 17,500 c.c., or about 70 lb., of sulphuric acid, at 2½d. per pound, amounting to 14s. 7d. The extra expense of the Gerber in this connection is 6s. 3d. per 1,000 tests. Against this must be set the saving of time, and there is also a saving in steam where steam turbine machines are used.

Accuracy of the Gerber System.—The following are some published results of tests of similar samples of the same milk by the Gerber system and gravimetric chemical analysis:—

	Fat-content by the Gerber System.	Fat-content by Gravimetric Analysis.
Milk (*a*)	3·8 per cent.	3·75 per cent.
,, (*b*)	3·8 ,,	3·71 ,,
,, (*c*)	3·8 ,,	3·70 ,,
,, (*d*)	3·2 ,,	3·26 ,,
,, (*e*)	3·3 ,,	3·45 ,,
,, (*f*)	4·1 ,,	4·11 ,,
Average ..	3·64 ,,	3·66 ,,

The results indicate that the Gerber system is capable of a high degree of accuracy, and that the system is accurate enough for all practical purposes.

TESTING CREAM BY THE GERBER SYSTEM.

There are several ways of testing cream by the Gerber system, and each requires glassware in some special form. After each method has been tried in conjunction with the Babcock system, an account of the work will be given.

CAUTION.

Care should be observed in handling the chemicals employed in the test. All are more or less strongly poisonous and otherwise harmful. Carelessness in handling may be attended by unpleasant consequences to operators and others.

FRUITGROWING.

W. A. BOUCHER.

CULTIVATION.

As a general rule, in order to secure the best results in the development of the trees and the production of fruit of good size and high quality, regular and thorough cultivation of the soil is most essential. It is desirable, if possible, to plough in the autumn, leaving the soil in the rough during the winter to weather and sweeten; cross-plough in the spring, and work down to a condition of fine tilth with disc or tine harrow. This should be followed by the working of the soil at regular intervals during the summer, either with a single- or a two-horse cultivator, with the object of preventing a growth of grass or weeds, and also, in the event of dry weather setting in, retaining in the soil the moisture that the trees require for encouraging summer growth and perfecting the crop of fruit. In most parts of New Zealand the average winter rainfall is abundant and well distributed, but it is no uncommon occurrence for dry weather and drying winds to set in during spring and early summer. If thorough cultivation of the soil has been maintained, abundant moisture for the needs of the trees and crops will be retained owing to the soil-mulch on the surface; but if cultivation has been neglected and the soil becomes compact, capillary attraction promoted by this condition will speedily bring the moisture from the subsoil to the surface, to be evaporated by the sun's rays or carried away by dry winds. In this connection it may be as well to point out that thorough cultivation is intended to include thorough pulverization of the soil, for in the case of clay lands, especially if the surface soil is left in a rough condition or full of clods, one of the principal objects of summer cultivation—*i.e.*, retention of moisture—will be defeated, for capillary attraction and evaporation from the subsoil will still take place, although not quite so rapidly, perhaps, as if there had been no cultivation. Horse-implements for the commercial and hand-implements for the domestic grower have been so far perfected that complete and thorough cultivation can be carried out at a minimum of cost and labour. In the commercial orchard of average size the practice will be to plough as much of the land as possible between the rows of trees, using a pair of horses, and finishing the strips along the

rows, that cannot be so worked, with a single horse and a light plough. If the bridle for the latter be made sufficiently long, it will be possible to run the plough quite close to the trunks of the trees without injury to the limbs or twigs, thus reducing, as far as may be, the amount of hand-labour required for digging or hoeing to make cultivation of the soil complete, it being, for many reasons, not desirable that strips along the rows or squares immediately around the trees should be left unworked.

For breaking up and pulverizing the soil after ploughing, an extension disc harrow will be found of great service, the extension principle allowing the implement to be worked close in to the trees, while the team required to draw it will be sufficiently far away to avoid injury to the limbs or trunk by harness or otherwise. With the same object in view many growers now use the two-horse cultivator, with an extension outside the wheels to promote the cultivation that is required after ploughing and pulverization have been accomplished.

GREEN-MANURING.

While clean cultivation during the spring and summer months is strongly recommended, the fact that this tends eventually to deprive the soil of the humus so necessary in most classes of land must not be lost sight of. In some districts autumn and winter growth is so rapid that by the time the spring ploughing is due the natural growth will be sufficiently luxuriant to renew, when ploughed under, the humus required. In other localities, with soil less fertile, it will be found necessary at intervals to sow late in the summer some quickly growing crop, such as seradilla, oats, and peas, mustard, rape, red clover, and other leguminous crops, which must be turned under in the spring. It is undesirable in most classes of land to sow in spring for ploughing under in the autumn, for should a dry season ensue both trees and crop will suffer, the trees probably to such an extent that they will not fully recover in two or three seasons.

PRUNING.

If the advice previously given with regard to the cutting-back at the time of planting (Plate No. 1) has been followed, it is desirable during the season after planting that the main growth should be interfered with as little as possible. It is, of course, necessary to remove suckers from the stock—such as the peach, for instance, will sometimes produce freely—and also shoots that may be furnished below what is destined to be the main-branch crown; but, as abundant and healthy foliage is necessary for the development of

both root and top, especially after the necessarily severe treatment to which the trees have been subjected when transplanted from nursery to orchard, so far from suppressing foliage by summer pruning or pinching, every effort should be made to encourage the production of vigorous leaf-growth.

During the winter or spring following the planting the young trees will need careful pruning, with the object of forming the permanent main-branch crown, as illustrated in Plate No. 2. Of the shoots formed, three of the strongest should be retained, and cut back to a bud 8 in. to 10 in. from their base, all other surplus

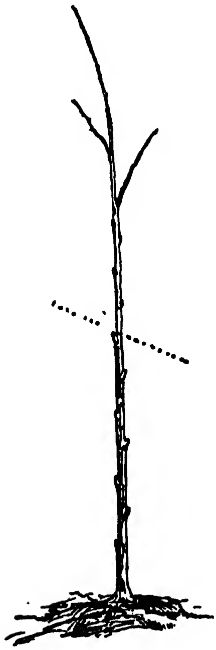


PLATE No. 1.
CUTTING BACK AT PLANTING.

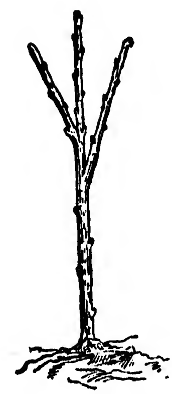


PLATE No. 2.
FIRST-YEAR PRUNED.

shoots being cut away cleanly to the main growth. In selecting the buds to cut back to, in the case of varieties showing a naturally compact habit preference will be given to those on the outside of the shoots, while in the case of those of a spreading or straggling habit preference will be given to buds on the inside of the shoots. By this means, to a large extent, uniformity of shape may be secured with varieties of diverse habits of growth, and the trees so formed that cultivation almost entirely by horse-implements may be carried out without injury to trees or crop.

During the second season after planting, summer pruning may be commenced with advantage—in fact, time that can be spared for

and devoted to this work will later on be found to have been well spent. One of the principal objects of summer pruning is to bring young trees into fruiting at an earlier period than would be the case if winter pruning alone were relied upon. In carrying it into effect the growth of each tree must be considered, and the trees pruned in proportion to their vigour. In the case of strong-growing trees, from one-third to one-half of the season's growth may be removed about the month of January, the object being to check

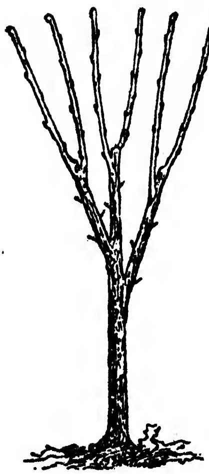


PLATE NO.
SECOND-YEAR PRUNED.

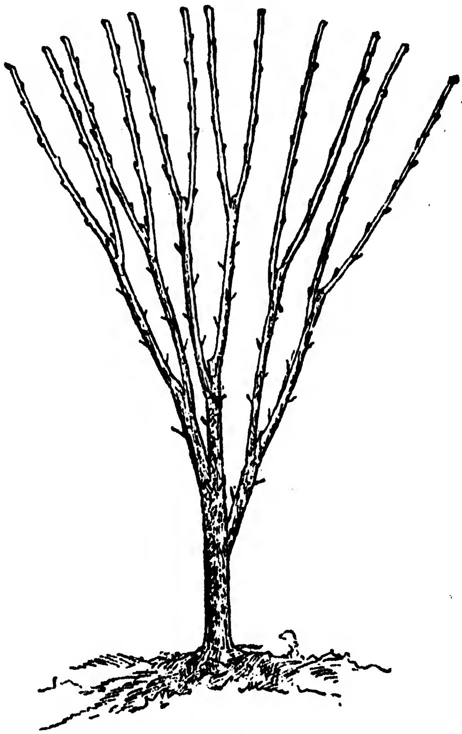


PLATE NO. 4.
THIRD-YEAR PRUNED.

the production of useless wood—which must in any case be cut away at the winter pruning—and, by diverting the sap from this purpose, cause the formation of vigorous fruit-spurs and plump, strong fruit-buds. With trees of less vigour the pruning will be less severe, and in the case of weakly trees summer pruning should be avoided altogether, for the value of the leaf-growth to the health and vitality of the tree must never be lost sight of, and to remove foliage from a weakly tree will almost certainly do more harm than good. It must not be supposed that summer pruning will entirely suffice, for winter pruning must follow in due course, and when

this has been completed the tree will appear as illustrated in Plate No. 3, each of the leading shoots having been cut back to 8 in. or 10 in. from the point where the growth of the season started.

The third and following seasons' pruning, both summer and winter, will be on much the same lines, although on a more extensive scale than that of the previous season (Plate No. 4). So far the pruning of laterals—*i.e.*, shoots that are produced along the main limbs and leaders—has not been dealt with. With vigorous-growing trees of some varieties of fruits, overproduction of laterals occasionally happens, necessitating moderate thinning-out; but, as a rule, by proper pruning the majority may be made fruit-bearing. With many varieties of the different classes of fruits care should be taken not to prune the laterals too short. Observation will show that, as a general rule, where a shoot, either leader or lateral, has been cut back, wood-growth is produced from the terminal bud left. Provision must be made for this by leaving a sufficient number of buds to allow the terminal to produce a wood shoot, as it will almost inevitably do, and also for the other buds which will eventually develop as fruit-producing. Consequently in the pruning of the laterals four or, in some cases, more buds should be left, and not, as is sometimes the case, a short stub with one bud only, which, as pointed out above, will almost certainly produce wood-growth, and not the fruit that is desired. It should also be borne in mind that too severe thinning and cutting of the laterals of strong-growing varieties when the trees are young and vigorous, especially when they are planted in rich soil, has a tendency to induce increased wood-production at the expense of the early fruiting which the trees are quite capable of and which most growers desire.

A number of varieties of the different classes of fruits are prone to produce fruit spurs and buds when the trees are still quite young, but there are also many other varieties where the reverse is the case, and it is in dealing with these especially that care and judgment must be exercised in both summer and winter pruning.

VARIETIES OF FRUITS FOR PLANTING.

The question, What varieties of the different classes of fruits are most suitable for planting *generally?* is one that presents considerable difficulty not only on account of the variations of surface and subsoil throughout the Dominion, but also on account of the wide range of climatic conditions. Moreover, as from time to time some of the new varieties that are continually being tested prove themselves suitable for planting either for commercial or for domestic

purposes, or for both, it is desirable that those who wish for information on this important point should consult officers of the Department or experienced fruitgrowers resident in the localities in which they are interested. Some of the varieties proved as commercially profitable are,—

APPLES.

American Horn,
Ballarat Seedling,
Cleopatra,
Colonial Washington,
Delicious,
Five-crown Pippin,
Golden Pippin,
Gravenstein,
Jonathan,
Lord Wolseley,
Munroe's Favourite (syn. Ohinemuri),
Northern Spy,
Pigeonette,
Reinette du Canada,
Rhodes Orange,
Rokewood,
Rymer,
Scarlet Pearmain,
Scarlet Queen,
Statesman,
Sturmer Pippin,
Yates.

Cox's Orange Pippin, one of the best for quality, is in many localities so subject to woolly aphis that it is not extensively planted as would otherwise be the case.

PEARS.

Beurre Bosc,
Beurre Capiaumont,
Beurre Clairgeau,
Beurre Diel,
Beurre Hardy,
Doyenne du Comice,
Fertility,
Glou Morceau,
Josephine de Malines,
Keiffer's Hybrid,
Louise Bonne of Jersey,
P. Barry,
Vicar of Winkfield,
Williams's Bon Chrétien,
Winter Cole,
Winter Nelis.

PEACHES.

Briggs's Red May,
Carman,
Elberta,
Gold Dust,
Golden Queen,
Hale's Early,
Hobbs's Late,
James's Seedling,
Kalamazoo,
Mamie Ross,
Muir,
Paragon,
Peregrine,
Queen Charlotte,
Royal George,
Salway,
Sea Eagle,
Sneed,
Triumph,
Wager,
White American,
Wiggins.

PLUMS (English).

Angelina Burdett,
Cherry Plum,
Coe's Golden Drop,
De Montfort,
Early Orleans,
Giant,
Golden Prune,
Grand Duke,
Jefferson,
July Greengage,
Kirke's,
Pond's Seedling,
Prince of Wales,
Purple Gage,
Takapuna Drop,
Tennent,
Victoria (Denyer's),
Yellow Magnum Bonum.

PLUMS (Japanese).

Burbank,
Lord Kitchener,
Ogon,
Satsuma,
Wright's Early.

NECTARINES.

Ansenne,
Early Rivers,
Gold Mine,
Hunt's Tawny,
Mrs. Dr. Chisholm,
New Boy,
Rivers's Orange,
Zealandia.

APRICOTS.

Hemskirke,
Large Early Red,
Moorpark,
Newcastle,
Oullin's Early.
Royal.

CHERRIES.

Bedford Prolific,
Black Eagle,
Black Heart,
Black Tartarian,
Burgdorff's Seedling,
Californian Advance,
Early Purple Guigne,
May Duke.

FIGS.

Brown Turkey,
Smyrna,
White Adriatic,
White Ischia.

ORANGES (Sweet).

Navel,
Paramatta,
St. Michael.

ORANGES (Marmalade).

Poor Man,
Seville.

LEMONS.

Eureka,
Lisbon.

LOQUAT.

Nagasaki.

QUINCES.

Angers,
Champion,
Orange,
Van Diemen.

JAPANESE PERSIMMONS.

Dai Dai Maru,
Haiyakume,
Tane Nashi,
Zengi.

WALNUTS.

English,
Franquette,
Large French,
Mayette.

STRAWBERRIES.

Duke of Edinburgh,
Fillbasket,
La Marguerite,
Laxton's No. 1,
Laxton's Noble,
Melba,
Phenomenal,
Sir Joseph Paxton.

RASPBERRIES.

Northumberland Fillbasket,
Semper Fidelis.

GOOSEBERRIES.

Red.

Conquering Hero,
Crown Bob,
Farmers' Glory,
Lion's Provider,
Ploughboy,
Rifleman,
Roaring Lion.

White.

Eagle,
Snowball,
Snowdrop,
Whitesmith.

Yellow.

Broom Girl,
Drill,
Gunner,
Smiling Beauty.

Green.

Green Overall,
Gregory's Perfection,
Marigold,
Plunder.

CURRANTS.

Red.

Cherry,
Fay's Prolific,
La Versailles.

White.

White Dutch.

Black.

American Black Champion,
Boskop Giant,
Carter's Black Champion,
Common Black,
Kentish Hero,
Lee's Prolific,
Maple.

Although this list is of considerable length, the fact that there are others of a great deal of merit which have not been mentioned is not to be overlooked.

The difficulty that presents itself, but that is being gradually overcome, is to find varieties—early, mid-season, and late—suitable for our local requirements, dessert or cooking, for canning or for export, that will adapt themselves to the different soils and varied climatic conditions of New Zealand.

An important point bearing on this question is the fact that already certain varieties, for instance, of apples, such as Gravenstein, Munroe's Favourite, Jonathan, Sturmer, Delicious, and of pears, such as Williams's Bon Chrétien, Beurre Diel, Beurre Clairgeau, Vicar of Winkfield, Winter Cole, and some others, have proved their adaptability to many different classes of soils and very varied climatic conditions.

As the number of generally adaptable varieties becomes extended —as it will, no doubt, year by year—the list of varieties now considered valuable by commercial growers, will be considerably curtailed with great advantage to orchardists and the industry, for, whether the local markets or an export trade are to be supplied, large lines of a few well-recognized varieties are to be desired, rather than small lines of a large number of kinds with the names of which the consumer is never likely to become acquainted.

Under the Quarantine Act of 1908 the Commonwealth Government has declared *Myxomycetes* App. and *Myagrum perfoliatum* Linn. (musk-weed) to be diseases affecting plants.

The British Government has allocated to the Rothamstead Experimental Station 2,500 acres of land, and has granted £3,000 towards the new laboratory of the station.

POTATOES.

VARIETY TESTS AT RUAKURA.

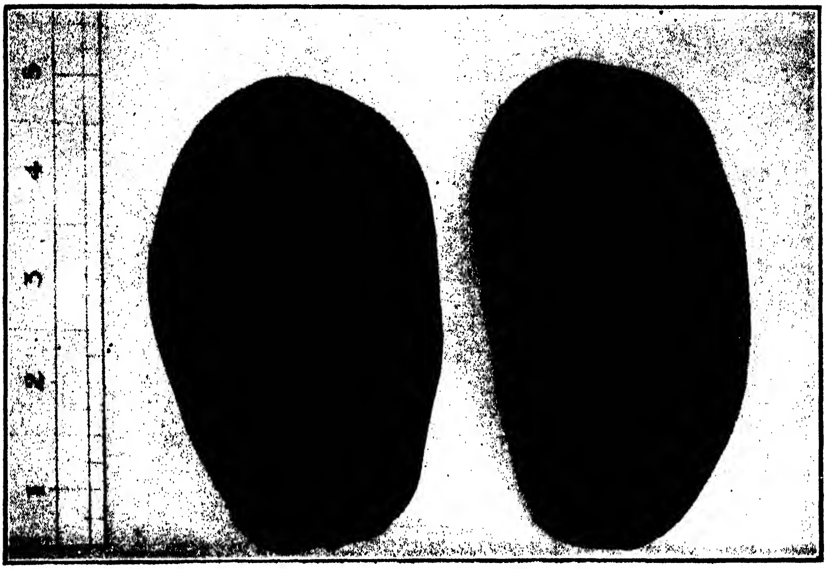
A. W. Green.

At the Ruakura Farm of Instruction potato experiments, to ascertain the most suitable varieties for the district—from the view-points of prolific yield, table quality, and resistance to disease—have been carried out for several seasons. The tests of the past season were conducted on an unusually large scale, with the object of giving the different varieties as complete a trial as possible. In all 159 varieties were tested, several being omitted from the accompanying list on account of the small quantity of seed of these available.

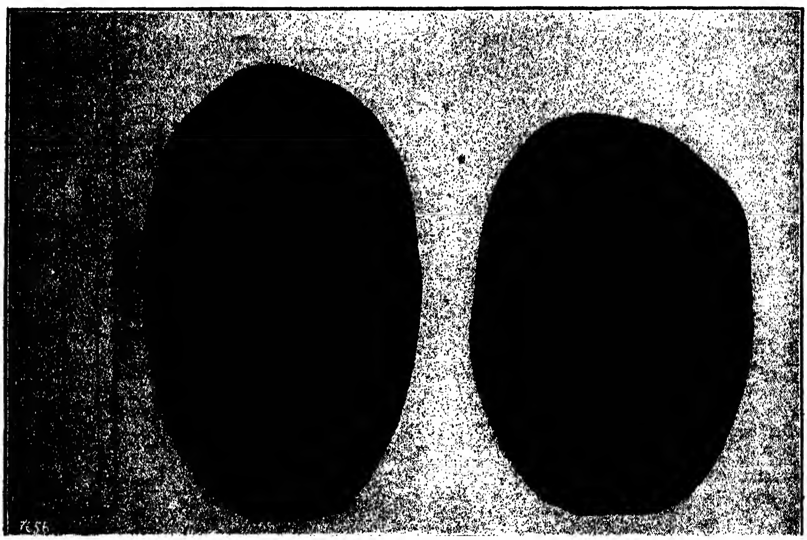
Trials based on such small amounts could scarcely be sufficient either to commend or to condemn a variety. They are therefore excluded from the main field test until larger stocks of each are obtained.

With all varieties mentioned in this report the conditions under which they grew were identical. The field proved a most suitable one for such an experiment, there being little or no variation in soil from one side of the potato-patch to the other. The soil was a sandy loam, with a clayey-pumice subsoil. Weather-conditions could have been more favourable, late varieties in many cases giving small tubers, due, no doubt, to the dry season.

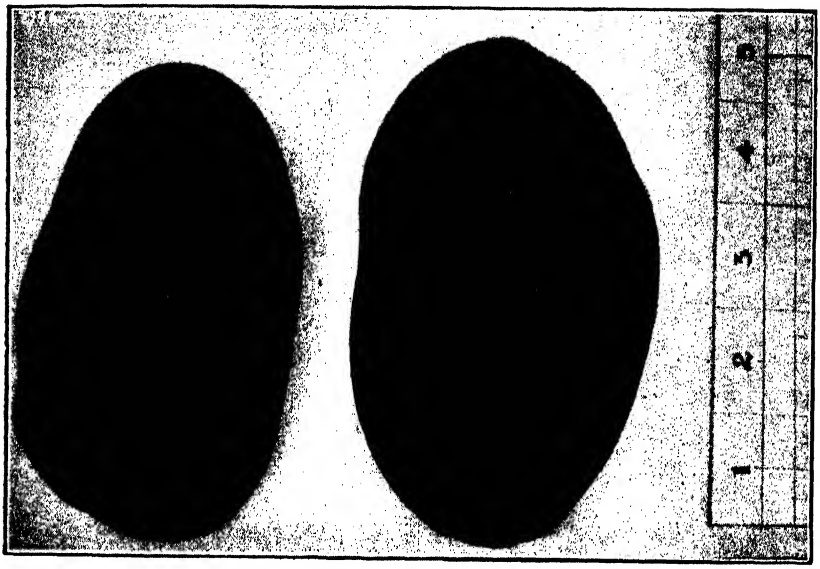
Up to the time of the experiment the field had been in grass for some years. It was ploughed with the digger plough in May of last year to a depth of 7 in., the skimmer being attached to turn a thin surface turf into the bottom of the furrow. In August it was again ploughed with the digger, Cambridge-rolled, cultivated to a depth of 8 in., chain-harrowed, and the couch-grass carted off. In October it was again cultivated and tine-harrowed, the potatoes being planted from the 10th to 14th October, in rows 27 in. apart and with the tubers about 12 in. apart in the rows. During winter the seed had been sprouted in boxes in an airy shed, and the potatoes were planted direct from the boxes, so as not to injure the original sprouts. This system also greatly facilitates the examination of the seed during the winter months, when all the tubers showing weak eyes or that are in any other respect undesirable can be rejected. The manure was sown by hand in the bottom of the ridges. The manure applied with every variety was as follows: 3 cwt. basic superphosphate, 3 cwt. bonedust, 3 cwt. Seychelles Island guano, 1 cwt. sulphate of potash, per acre.



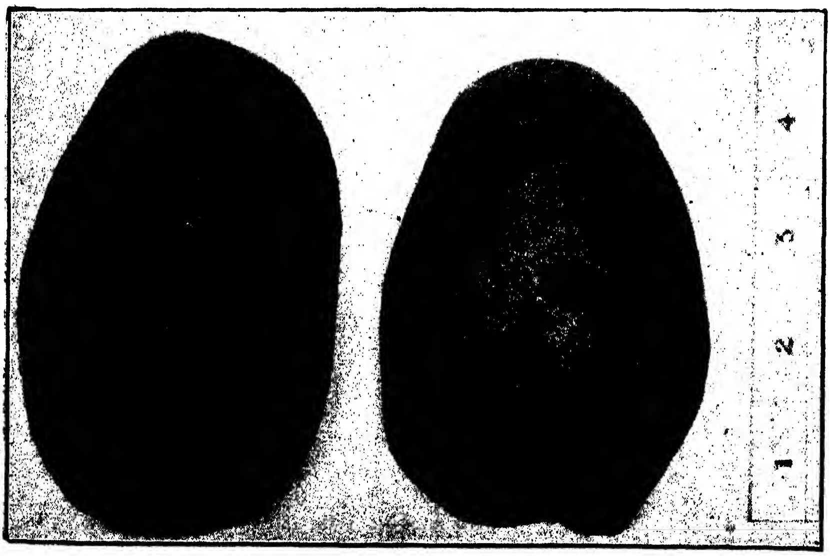
CONQUERING HERO. CONQUEST.



THE SCOTT. CORONATION.



FACTOR. SOUTHERN CROSS.



GOLD COIN. UP-TO-DATE.

Three sprayings were given during the season, the spray being Bordeaux mixture at a strength of 4-5-50. The crop was well cultivated with the single horse-cultivator, and on the 4th and 5th December was moulded up. The crop was lifted in March.

The letter D alongside a variety signifies that it is to be discarded on account of poor yield and weak vitality. In a few instances low yields have not condemned the variety, such as those given by Discovery, Flounders, Honey Rose, Ruby Queen, Sharp's Victor, Syon House Prolific, and White Elephant. These are retained for selection, as some roots of each produced heavier returns than the average, and in the case of the two first-mentioned varieties the proportion of useless tubers to large ones is small.

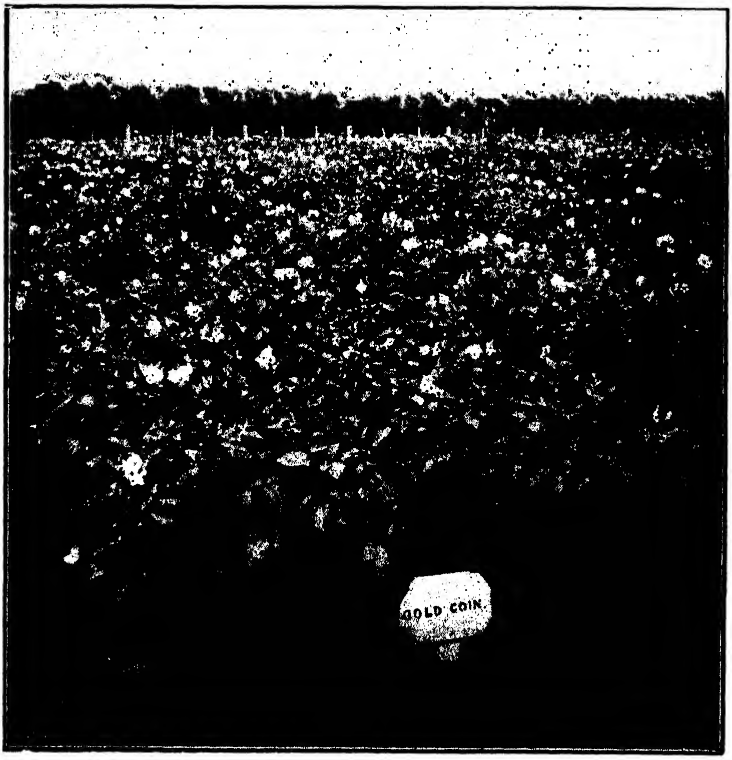
One of the most disappointing varieties is Gamekeeper, for although the total yield amounted to 11·14 tons per acre, the proportion of small worthless tubers ran far too high. This potato is amongst the latest introduced into the Auckland District, and, granting that it has in its favour blight-resisting properties, it cannot compare with a standard variety such as Up-to-Date for size and quality of tuber. Taking the yield per acre of large and seed-size potatoes, 4·64 tons, it may be pointed out that of this weight not more than 1 ton could be classed for size as table-potatoes. In growth this variety very much resembles Northern Star. Both haulms and flowers are similar, and the peculiar root-growth which characterizes Northern Star is found in Gamekeeper also. The tubers have a tendency to form second growth, which gives rise to a continuous development of small tubers. Reports from numerous local growers confirm the results obtained here, and few intend to plant Gamekeeper again.

There is a wide range of type amongst the many varieties recorded herewith, varying from a uniform smooth skin to an uneven deep-eyed potato, but no attempt will now be made to describe each variety separately. A few notes on the disease-resistance of several varieties and the susceptibility of others should prove of more value. For resistance to blight Scotia can claim first place, but, unluckily, on this soil its quality is too poor for table use. Northern Star, Southern Cross, Irish Queen, Gamekeeper, Commercial, Alpha, and White American rank next, and among these Southern Cross is the best in quality.

With a little attention to spraying, the value of which has been repeatedly proved, the following varieties—all of high quality—can be grown successfully in this locality: Up-to-Date, Bountiful, Supreme, Conquest, Factor, Gold Coin, Conquering Hero, Puritan, Daniel's Sensation, Coronation, and The Scott.

Varieties most liable to blight are Duke of Rothsay, British Queen, Dalmahoy, Lapstone Kidney, Hobarts, Early Vermont, and Market

King. Those most susceptible to scab: Victor Rose, Red Federation, Irish Queen, Early Thoroughbred, and Commercial. The variety Burbank, a heavy yielder producing large even-sized tubers, cannot be recommended for this district on account of a brown-rot disease which attacks the tubers, and which is very noticeable on cutting them. The number affected represented 84 per cent.



A Section of the Potato Experimental Plots at Ruakura Farm of Instruction.

In conclusion, it must be stated that every effort has been made to secure the strains true to name, so that the variety should be rightly represented. If, therefore, any grower has obtained results with any of the varieties named which are at variance with these records at Ruakura, he would do well to communicate with the Department, so that a further test may be arranged. On the other hand, if growers whose records are in agreement with those at Ruakura would report to that effect, the information would prove most valuable, and would greatly assist the Department in arranging for further experiments.

Variety.	Yield per Acre in Tons. Large and Seed Size.	Small.	Total.	Variety.	Yield per Acre in Tons. Large and Seed Size.	Small.	Total.
Abbey Craig	7·66	1·43	9·09	King Edward VII ..	5·29	1·05	6·34
Acme	7·18	0·86	8·04	King of the Russets D ..	3·66	1·43	5·09
Adirondack	4·73	1·52	6·25	Late Rose	8·31	1·42	9·73
Albans Early Pink ..	8·52	3·27	11·79	Langworthy	4·87	2·37	7·24
Alpha	9·21	2·87	12·08	Lapstone Kidney D ..	4·55	0·96	5·51
Ashleaf Kidney ..	4·42	2·21	6·63	Le Breton D	2·68	3·82	6·50
Bath Kidney D ..	3·05	1·52	4·57	Lord Roberts	8·13	2·23	10·36
Beauty of Hebron ..	6·14	1·79	7·93	Magnum Bonum ..	8·06	1·64	9·70
Beauty of Hants D ..	4·50	1·50	6·00	Marche's Favourite ..	7·78	3·75	11·53
Beaumont D	1·91	1·34	3·25	Maori Chief	6·53	1·13	7·66
Bessie Plaides ..	4·98	1·94	6·92	Market King D. ..	0·96	1·92	2·88
Bismarck	12·77	1·43	14·20	Millionmaker	5·74	6·61	12·35
Bountiful	12·18	3·27	15·45	Motor	5·41	1·35	6·76
Bobbies	7·79	2·60	10·39	Monarch	7·84	1·04	8·88
Bread Fruit	5·74	0·86	6·60	Myatt's Prolific ..	10·00	2·66	12·66
Britannia	8·14	2·23	10·37	New Colonist	9·40	2·61	12·01
British Queen	8·49	1·17	9·66	Northern Star ..	10·75	4·21	14·96
Brownell's Beauty ..	5·92	0·92	6·84	No Surrender	8·32	3·03	11·35
Brown Rivers ..	5·75	2·58	8·33	North Pole	8·92	3·50	12·42
Burbank	11·50	2·44	13·94	Orange Blossom ..	11·50	2·87	14·37
Cardinal D	5·85	1·47	7·32	Paragon D	2·51	2·85	5·36
Californian D	2·85	2·30	5·15	Peckover	10·89	3·04	13·93
Challenge Victorian ..	6·04	2·05	8·09	Pink Eye D	5·75	4·89	10·64
Cigarette D	3·45	1·15	4·60	Plunkets D	3·75	1·15	4·90
Cliff Kidney	7·33	1·61	8·94	Pride of Tonbridge ..	6·53	2·61	9·14
Commonwealth ..	9·80	1·67	11·47	Princess Victoria ..	5·31	3·41	8·72
Commercial	10·97	1·42	12·39	Prince Regent ..	8·15	3·32	11·47
Conquering Hero ..	10·47	0·63	11·10	Purple Kidney ..	7·44	1·49	8·93
Conquest	14·56	2·91	17·47	Puritan	8·62	1·72	10·34
Coronation	10·06	2·01	12·07	Quarantine No. 4 D ..	2·30	0·86	3·16
Cow	6·56	1·09	7·65	,, No. 7	7·07	2·61	9·68
Dakota Red	7·13	2·92	10·05	Red Rocks	9·57	1·64	11·21
Dalmenney Hero ..	7·57	2·08	9·65	Red Skins	6·27	1·38	7·65
Dalmenney Beauty ..	8·53	1·16	9·69	Red King	5·38	1·78	7·16
Dalmahoy	9·24	1·47	10·71	Radium	6·13	1·25	7·38
Daniel's Defiance ..	6·94	2·68	9·62	Royal Kidney ..	6·64	3·98	10·62
Daniel's Sensation ..	11·54	2·17	13·71	Royal Purple	6·20	2·73	8·93
Discovery	4·69	0·93	5·62	Royal Ashleaf ..	8·40	4·20	12·60
Diamond	9·10	1·77	10·87	Roundheads	8·62	1·56	10·18
Dickson's Round Seedling	7·79	1·37	9·16	Ruby Queen	4·64	1·32	5·96
Dreadnought D ..	Nil	1·53	1·53	Runciman's Purple ..	7·71	1·96	9·67
Duke of Rothsay ..	10·48	1·52	12·00	Russell's Perfection ..	10·06	3·01	13·07
Duke of York ..	4·31	2·86	7·17	Schoolmaster	6·37	0·69	7·06
Duke of Albany ..	10·68	2·52	13·20	Scottish Triumph ..	9·85	3·28	13·13
Duchess of Buccleugh ..	8·16	1·82	9·98	Scotia	9·47	4·17	13·64
Duchess of Cornwall ..	5·11	1·27	6·38	Scotch Grey D ..	2·74	0·91	3·65
Early Norther ..	7·31	0·78	8·09	Sharp's Victor.. ..	4·09	1·36	5·45
Early Thoroughbred D ..	2·02	3·38	5·40	Sir Walter Raleigh ..	6·63	0·88	7·51
Early Provider D ..	3·88	1·94	5·82	Snowball	12·00	2·24	14·24
Early Vermont D ..	3·59	1·79	5·38	Snowdrop	8·49	1·30	9·79
Eclipse D	1·91	0·95	2·86	Snowflake	12·75	1·21	13·96
Eldorado	6·30	2·88	9·18	Solanum Commersonii ..	9·00	1·33	10·33
Emperor D	2·46	4·51	6·97	Southern Cross ..	10·12	2·00	12·12
Empress Queen ..	5·27	1·29	6·56	Skerry Blue	10·00	1·50	11·50
Evergood	9·83	2·88	12·71	State of Maine ..	7·69	1·04	8·73
Evelyn	8·26	1·58	9·84	Spark's Victoria D ..	0·96	3·84	4·80
Excelsior	11·23	2·08	13·31	Supreme	10·97	2·41	13·48
Factor	11·05	1·37	12·42	Surecrop	9·75	2·77	[illegible]2·52
Federation	9·37	0·56	9·93	Sunrise	10·26	2·89	13·15
Findlay's Challenge ..	7·47	2·83	10·30	Syon House Prolific ..	4·45	1·44	5·89
Findlay's Aurora ..	9·14	2·61	11·75	Star of New Zealand ..	10·62	2·39	13·01
Fifeshire Beauty ..	8·91	0·92	9·83	Tauranga Beauty D ..	4·02	2·31	6·33
Findlay's Rosabelle ..	10·38	3·19	13·57	Teneriffes	11·59	0·78	12·37
Flounders	5·80	0·81	6·61	The Bruce	9·24	1·90	11·14
Fluke Kidney D ..	3·51	1·36	4·87	The Scott	8·98	1·30	10·28
Gamekeeper	4·64	6·50	11·14	Up-to-Date	13·93	2·32	16·25
Gem of the South ..	7·50	3·75	11·25	Unknown	6·03	2·01	8·04
German Jack D ..	2·05	0·85	2·87	Victor Rose	9·46	1·65	11·11
Gold Coin	10·04	2·38	12·42	Victoria Elba	7·94	3·42	11·36
Goldfinder D	2·17	1·79	3·96	Victorian D	3·73	5·17	8·90
Good Luck	10·06	1·63	11·69	Vicar of Laeham D ..	2·65	1·76	4·41
Guernsey Snowflake ..	7·21	3·13	10·34	Waeroma Red.. ..	9·93	1·03	10·96
Hobarts	6·98	3·55	10·53	Waitotara Beauty ..	6·35	1·66	8·01
Honey Rose	4·31	1·43	5·74	Warrior	8·98	1·43	10·41
Ivanhoe *	6·38	1·91	8·29	W. P. Blow	11·50	1·24	12·74
Invicta	8·84	1·47	10·31	White American ..	11·94	2·74	14·68
Ireland's Farewell D ..	4·79	2·86	7·65	White Empress ..	7·68	2·18	9·86
Irish Flourball ..	8·95	1·73	10·68	White Rocks	10·78	1·76	12·54
Irish Queen	9·11	1·97	11·08	White Elephant ..	4·07	1·01	5·08
Irish Rocks	10·70	2·72	13·42				

CHESHIRE CHEESE.

MISS G. N. DAVIES, N.D.D.

CHESHIRE cheese takes its name from the county in which it was first made, though its true origin has not been discovered. Famous throughout England, especially in the north-west, it is little known abroad, and, unlike Cheddar, is not manufactured in the British colonies or America. For some little time Cheshire cheese has been made in Holland and exported from that country to England. About two years ago an arrangement was made through the medium of the Board of Agriculture by which cheese of the Cheshire type manufactured in Holland should be exported to England with the words "Dutch product" marked on them. There is no reason why Cheshire cheese should not be made in New Zealand and exported like Cheddar, especially as the yield of the former from a given quantity of milk is greater than that of the latter.

In a cheese which is only a few months old and is newly ripened, the water should be in higher proportion than in Cheddar, due to the large quantity of whey retained in the making. The higher the proportion of water the greater the proportionate loss within a given time by expulsion and drying. In Cheshire the texture is the most noticeable characteristic, being loose, open, and flaky, strikingly unlike the Cheddar's smooth solidity. This gives a softness and appearance of quality much appreciated by cheese-merchants in the North of England. The size and shape of a Cheshire cheese are usually similar to those of Cheddar.

To obtain the best results in making Cheshire cheese, as in the case of all others, it is necessary to have the milk delivered at the factory clean, sweet, and of good flavour. Bad odours of every kind are freely absorbed by milk and indelibly impressed on the produce made from it.

There are three different modes of cheesemaking followed in Cheshire, known as (1) the "early" ripening, (2) the "medium" ripening, and (3) the "late" ripening processes. There is also a method of making which produces a cheese that is permeated with green mould when ripe, and is called "Stilton-Cheshire." The last-named variety, however, is not very often made, and is confined to limited districts in the County of Cheshire. The early-ripening cheeses are made mostly in the spring of the year, the

medium-ripening next, and then the long-keeping, changing again to the medium process towards the end of the season.

In making, it is not possible to lay down any exact or rigid order of procedure which will answer under varied conditions. The following rules are, however, followed generally in the making of Cheshire cheese:—

ACCOMMODATION.

The rooms generally provided for making and ripening the cheese are: making-room, press-room, and ripening or curing room; also a boiler-room.

The Making-room.—The making-room should be light, well ventilated, and well drained.

The Press-room.—This should be of similar construction to the making-room, and in the farmhouses in Cheshire it always contains a "cheese-oven," which is a chamber built in one of the walls in which the newly made cheese is put the first day. It is usually built near a fire, so that it can be heated easily and kept at a temperature of 72° to 74° F. However, in a cheese-factory the "cheese-oven" may be a room near the boiler-room, or else conveniently heated, so that the cheese can be kept at the required temperature.

The Curing-room.—The curing-room should be free from draughts and the windows fitted with shutters to darken it.

The temperature of the making-room should be 60° F., the press-room 65° to 70° F., and the curing-room 55° to 60° F.

UTENSILS REQUIRED.

The utensils required are milk-vats, curd-knives (which are coarser than those used in Cheddar-making), cheese-moulds with hoops for the top, curd-shovels, cheese-presses, cheese-stools for turning cheese on, pails, cloths, &c.

The Cheshire Curd-mill.—This is fitted with spiked rollers, and is capable of reducing the curd to the size of large peas.

The Moulds or Hoops.—The moulds used in making Cheshire cheese should be fitted with tin and wooden followers.

Colouring-matter.—Until recent years cheese-colouring has always been made from the annatto-seed grown in South America, but now cheaper and stronger colouring-matter is made from aniline, a coal-tar product. Different markets require different shades of colour, whilst some markets prefer uncoloured or white cheese; hence Cheshire cheese is made both coloured and white.

THE EARLY-RIPENING PROCESS.

The setting-temperature is lower than in the medium or long-keeping, being only 78° to 80° F. When the milk is heated to this temperature the colouring-matter should be stirred in well, and then the rennet is added. In the case of early ripening a larger proportion is used—in fact, up to 50 per cent. more than in the other systems. The curd is tested as usual with the finger or thermometer, and, when firm enough, is cut into cubes the size of dice. It is then stirred carefully for three-quarters of an hour, and afterwards allowed to settle in the whey until it leaves the sides of the vat quite ½ in. During this time acidity has been developing. The curd is now gathered to one end of the vat and the whey run off. It is then left on the bottom of the vat to drain. Afterwards it is cut and put in a cloth on the rack, which has been placed in the vat, and then turned a few times to assist drainage. When sufficiently dry and showing 0·4 to 0·5 per cent. of acidity it is broken up with the hands, the curd-mill not being used, and salted. Less salt is added than in the case of the other methods. The curd is now ready to fill into the moulds, which have previously been lined with cloths. After standing twenty-four hours the cheese is turned into a clean cloth and mould, and put under slight pressure. It remains in the press for the following two or three days, and is taken from the press each morning and turned, a clean dry cloth being used. The cheese is then taken from the press whether drainage has ceased or not, a thin calico bandage is pasted round the sides, and it is removed to the ripening-room, where it is turned every day. In about four weeks the cheese is ripe and ready for sale.

Early-ripening cheese, although not of such high character as the others, is profitable, as a large quantity is produced from a given quantity of milk, and it is placed on the market early. It is not suitable for export, as it will not keep, and therefore has to be used up quickly. Also, being soft, it will not carry well or stand rough handling.

MEDIUM-RIPENING PROCESS.

This is the most suitable kind for manufacture in New Zealand for export, as it ripens and is ready for eating in from three to four months. The milk is regulated to a temperature of 84° to 86° F., and starter added at the rate of 1 per cent., so that the acidity of the milk at renneting will be 0·19 to 0·2 per cent.

Colouring.—Colouring-matter is used in the proportion of 4 oz. to every 100 gallons of milk, and should be added and mixed well

with the milk at least ten minutes before the rennet, otherwise there is danger of discoloration. Also it should always be mixed with water before being added to the milk.

Rennet.—Rennet-extract is added at the rate of 4 oz. to every 100 gallons of milk, care being taken to dilute it with water before stirring into the milk. After adding the rennet the maker must be very careful not to overstir. Stir well into the milk for three minutes and then skim over the top, in order to prevent the cream from rising to the surface. The rennet may show effect in about twelve minutes.

Cutting.—The curd should be ready to cut in about fifty minutes, but this can be determined by its splitting cleanly when tried on the finger or thermometer. The curd should always be cut as soon as it is ready. Immediately after cutting, clean the sides and bottom of the vat with the hands; also take a little curd out of the tap (this is also done after adding the colouring and rennet). Then take an acid test, which should be 0·13 to 0·14 per cent. Stir very carefully at first to prevent loss of fat in the whey.

Scalding.—After stirring the curd for about twenty minutes, start scalding; this should be done slowly, the temperature being raised 1° in five minutes. Raise to a temperature of 90° to 92° F., and stir until cooked. This is decided when the curd is fairly firm and rounded at the ends. Stirring should occupy about three-quarters of an hour.

Pitching.—When the above desirable points are obtained the curd is left to lie in the whey or "pitch." Let it remain until the curd leaves the sides of the vat ½ in. In dealing with a small quantity of curd cut down the centre and roll to one end, or, if a large quantity, gather to one end with the rake. A Cheshire curd should be smeary throughout, not like a Cheddar. The whey may now be run off.

After Removal of Whey.—The acidity after the removal of the whey should be 0·17 to 0·18 per cent. Next cut the curd into squares and leave for about fifteen minutes; then turn. Afterwards, cut into 5 in. cubes and place in a cloth which has been put over racks in the bottom of the vat or, if the curd be very acid, on a cooler. Generally, cut the curd up when the acidity is 0·25 per cent. Later, tear (not cut) the curd into pieces the size of oranges; open out the cloth and stir every ten minutes until sufficiently dry and acid for milling.

Milling.—When ready for milling the curd should show 0·35 per cent. acid with the acidimeter. After going through the curd-mill it should appear the size of Indian corn. Some makers put it

through the mill twice. The reason for having finely ground curd is to give the cheese a fine, crumbly, granular texture when ripe, and to allow drainage at night. The cheese is now ready for salting; quantity of salt according to season, 2 lb. to 2½ lb. per 100 lb. of curd being used.

The cheese moulds or hoops should be lined with cloths and the curd filled in. Cheshire curd is not packed into the moulds like Cheddar. The cheese is now removed to the cheese-oven or a room kept at a temperature of 74° F. and left for four hours, after which it is turned into a clean dry cloth, put back into the mould, and replaced in the oven.

The next morning the cheese is taken out of the oven, turned into a clean dry cloth, and replaced in the mould. During the time the cheese has been in the oven it has been developing acid, the curd contracting and whey exuding. The acidity should now be about 0·92. Less pressure is used than in the case of Cheddar cheese, as the curd is softer and retains more moisture.

It is now put into the press, where it remains for about four days or until dry, being turned each morning into a dry cloth. Pressure should be applied gradually, for if too great a weight be applied the first day some fatty matter goes off in the whey. A curd having a tendency to over-acidity should only be pressed lightly, in order to retain as much moisture as possible, while no amount of pressure will get the whey out of a moist under-acid curd, and when it leaves the press it will heave.

When the cheese is taken from the press a calico bandage is pasted round the sides. The cheese when dry is taken to the curing-room. Each end should be rubbed with soft grease or oil to prevent cracking, after which it is turned every day for the first week; then every other day until ripe.

The Late-ripening Process.

There is not a great deal of difference between this process and the medium. The curd is cut finer, the scald is higher, and less acidity is developed.

The milk is regulated to a temperature of 88° to 90° F., and the annatto stirred in well, and the rennet added at the rate of 3½ oz. to 100 gallons of milk. In sixty or seventy minutes, or as soon as firm enough, the curd is cut. After stirring for about thirty minutes the temperature is raised to 94° to 95° F., the mass being well stirred and thoroughly and uniformly heated. Then allow the curd to settle for about ten minutes, after which it is gathered to one end of the vat and the whey run off. The

development of acidity is prevented as much as possible. A rack is now placed in the bottom of the vat and covered over with a curd-cloth, and the curd cut into cubes, lifted into the cloth, and turned at intervals of about fifteen to twenty minutes. As soon as dry enough it is weighed, milled, and salted, salt being added at the rate of 2½ lb. to 2¾ lb. per 100 lb. of curd.

The following part of the process is the same as in the medium, excepting that 50 lb. weight is put upon the cheese when in the cheese-oven.

THE "STILTON-CHESHIRE" PROCESS.

The first part of the process is just a repetition of the previous ones, the setting-temperature being 86° F. The curd, after being cut, is stirred for three-quarters of an hour, and is not heated whilst in the whey. The whey is run off as soon as possible to prevent the development of much acidity. Then it is placed on the draining-racks, and cut and turned several times. As soon as it has drained sufficiently it is broken up, salted, put into the moulds, and then placed in the cheese-oven for twelve hours. When it is taken out of the cheese-oven a light weight of ½ cwt. to ¾ cwt. is placed on it for two days, after which it is put under slight pressure for two more days, being turned each morning into dry, clean cloths. It is then taken out of the press, bandaged, and taken to the curing-room, where it is treated like any other cheese.

The object is to produce an open flaky curd, in which little acidity is developed but which at the same time is dry enough to ensure proper ripening. It is preferable that the cheese should not have ceased draining when it comes from the press, for, if it have, it is an evidence that too much acidity is present, and consequently the curd will be close.

This is the only class of Cheshire cheese that develops green mould, the early-ripening cheese being too acid and the medium- and late-ripening cheese having too close a texture. This class of cheese is purchased generally in a new state, and the buyers complete the ripening in warm cellars in their own warehouses. This kind seems to be sold only in limited districts in the county.

It is evident that there is a marked difference between the methods of making. In the early-ripening process more rennet is used, and more acidity is developed, while less salt is added and less pressure employed than in the other processes. The medium-ripening process is the one generally used.

When a cheese is twenty-four hours old it is possible to tell whether it will be good or bad. If it be concave (hollow) on the

top when turned over the first time, it is good, if convex (rounded), it is bad.

Too much acidity often results in a discoloured or streaky cheese, though sometimes discoloration is caused by an organism. To avoid this the milk should be kept sweet, and a large quantity of starter added.

A Cheshire cheese should take four hours to make from start to finish, and the popular size is 15 in. by 15 in.

When prepared for shows or sale the cheese should have a clean white calico bandage round the sides. On each end the mould should be left in the centre, and a circle of about 1½ in. round the edge should be rubbed and made to shine with oil or grease.

The Jersey bulls under one year of age sold by the Ruakura Farm of Instruction this year have averaged slightly over £40.

Catalogues of the annual sale of the Weraroa Experimental Farm milk-record yearling bulls may be obtained on application to the Fields and Experimental Farms Division, Wellington.

Experience has shown that the best temperatures for pasteurizing cream for buttermaking in New Zealand are 176° to 185° F., varying according to the quality of the article dealt with.

The Cheddar cheese produced by the method of using pasteurized milk has been of high and uniform quality with almost perfect texture, and has commanded the highest market prices.—*Year-book of the United States Department of Agriculture.*

During the past season over 25,000 cows, purebred and crossbred members of ordinary dairy herds, were tested in New Zealand, while over 300 pedigree cows were officially tested in connection with the Register of Merit scheme by officers of the Department.

A catch-crop of barley and tares at the Ruakura Experimental Farm is being fed off with dairy cows, and the results are confirming last year's experience at Ruakura with this crop. Previous to their removal to the barley and tares field all the cows in milk were each receiving 1 lb. decorticated cotton-cake and about 6 lb. of oaten-sheaf chaff, and although these two feeds have now been dropped the milk-yield per cow has increased.

DAM OF THE SIRE OF ST. C. OLINDA II, ONE OF THE JERSEY BULLS RECENTLY IMPORTED BY MR. J. G. HARKNESS.
This cow has a record of 772 lb. of butter-fat in the year.

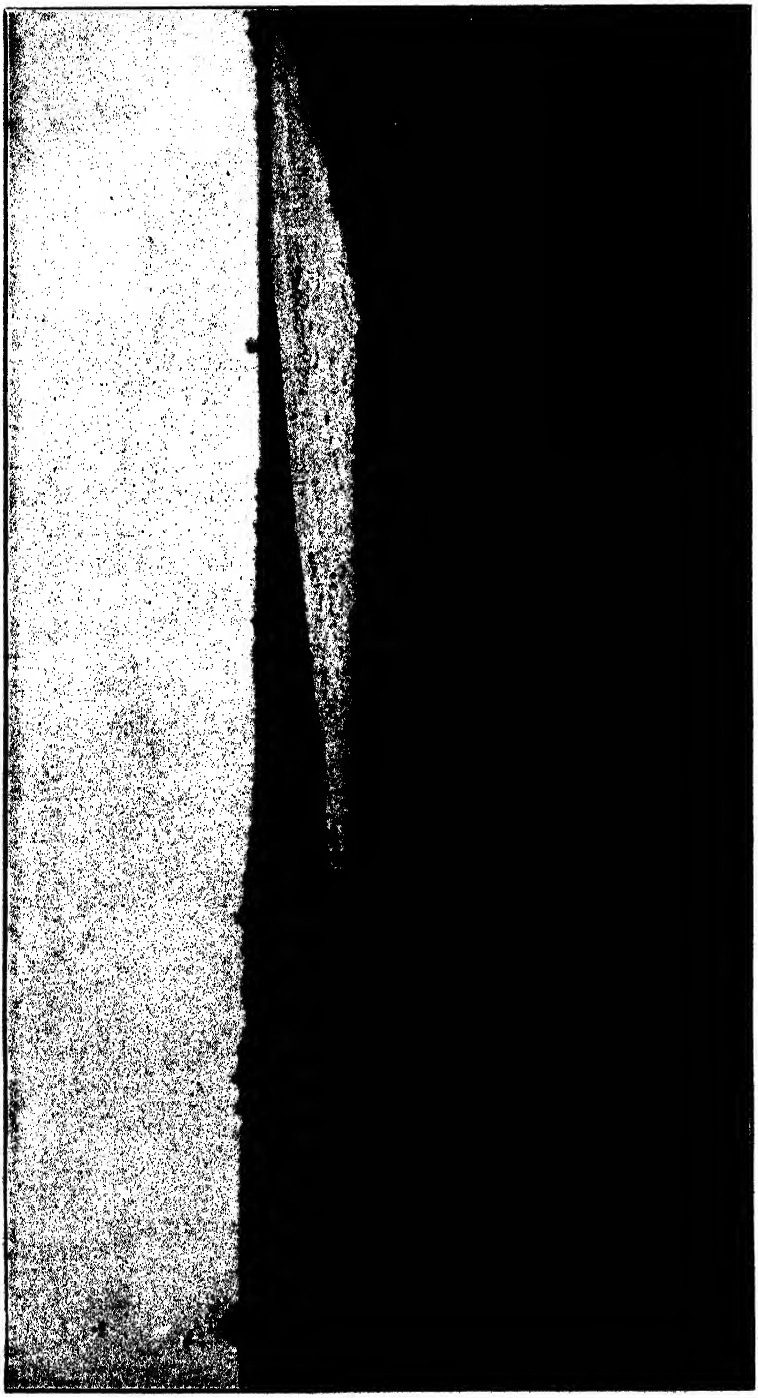
PAKIHI LANDS.

NOTE ON THEIR TREATMENT.

B. C. Aston, F.I.C.

Nelson is fortunate in possessing in Mr. F. G. Gibbs, president of the Nelson Institute, a gentleman of singular energy, ability, and organizing-power. Of the many good works which will be remembered to his credit, not the least will be his recognition of the possibilities lying dormant in the Collingwood pakihi lands. But he has gone further than most professional men would dare. Not content with using tongue and pen in urging the farming community to attempt something with these waste lands, he has himself, in the face of some scorn from those whose business it is to till the soil, occupied an area, in the heart of the wilderness, of some moorland, and has fenced, ploughed, manured, and sown in grass an area which gives every present indication of successful reclamation. What is the most pleasing feature of this courageous undertaking is that Mr. Gibbs now has the enthusiastic sympathy of those who were at first sceptical as to the success of his experiments.

"Pakihi" is a Maori word signifying an opening or clearing free from forest. The pakihi lands of the west coast of the South Island were described in an article by me in the first number of this *Journal* (p. 22, Vol. i, No. 1, 1910), but had previously been the subject of investigation by me in 1906 (see Report of the Department of Agriculture, Chemistry Division, 1909, pp. 464–467), when the manurial treatment was recommended which has subsequently proved so successful in the field. In these articles it is conclusively shown that only by heavy dressings of lime and phosphates applied after draining the land can one expect to utilize these soils profitably. Subsequently both Mr. G. de S. Baylis and Mr. A. Macpherson, the Fields Instructors of the Department, carried out field experiments on pakihi land. (Their reports will be found in the *Journal*, Vol. v, No. 1, p. 71, and Vol. v, No. 2, p. 126, 1912.) Mr. Baylis directed the experiments in Westland and on Mr. Gibbs's Onakaka, Collingwood, property. His results amply bore out my original advice as to the necessity for drainage, lime, and phosphates. Mr. Macpherson's experiments were con-

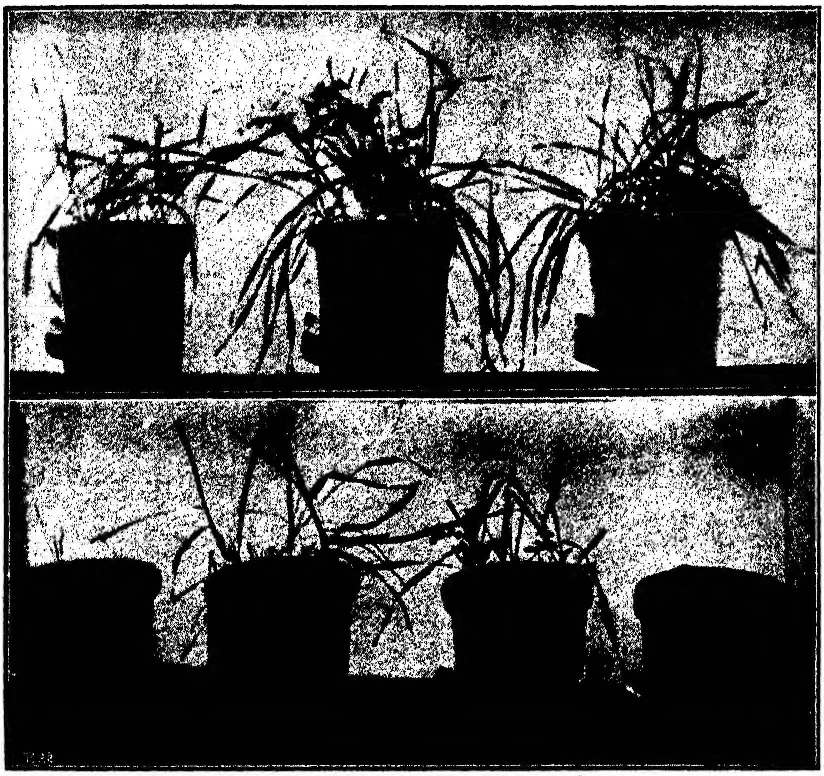


F. G. Gibbs, photo.]

ONAKAKA PAKIHI.

Summer photo of fenced area. Bare patch in centre is the half-acre plot which has no manure, though otherwise treated the same.

fined to drainage by explosives of a pakihi area on the Buller Domain, which presents unusual difficulties owing to the occurrence near the surface of an obstinate conglomerate cemented with iron oxide. Mr. Macpherson states "that inspection of other pakihi



B. C. Aston, photo.]

POT EXPERIMENTS WITH COLLINGWOOD PAKIHI SOILS.
(Reading from left to right.)

Lower Shelf.

1.	2.	3.	7.
Nil.	½ ton slag.	2 tons slacked lime.	1 ton slacked lime. 2 cwt. superphosphate. ¾ cwt. muriate of potash.

Upper Shelf.

4.	5.	6.
1 ton slaked lime. 2 cwt. superphosphate.	2 tons lime. 5 cwt. slag.	1 ton lime. 5 cwt. slag. ¾ cwt. sulphate of potash.

Note poor result on unmanured pot.

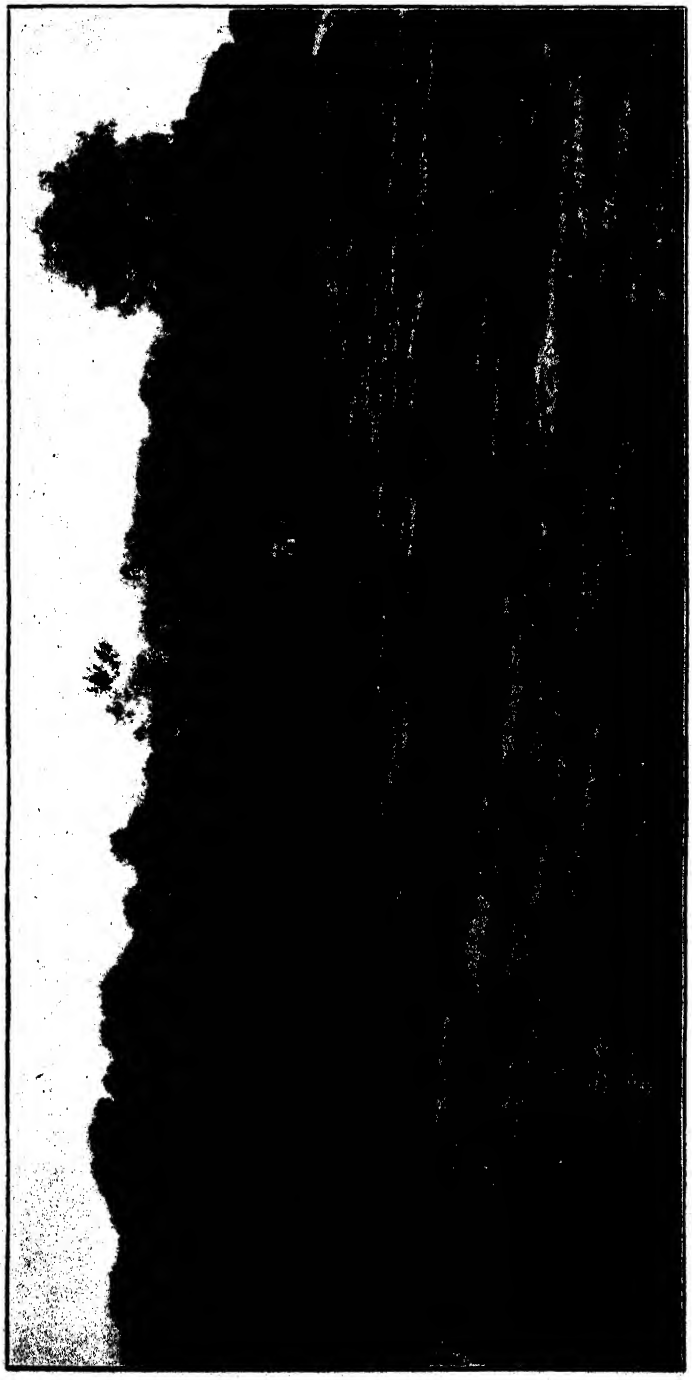
lands round Westport shows that they do not present the same difficult proposition as that met with in the Buller Domain, and that very large areas can easily be drained and dealt with at very little cost."

The Collingwood pakihis are of limited extent, probably within 10,000 acres. The great value of experiments here will be as a guide in suggesting economical methods of treating the Westland pakihis, which are of vast extent. The Collingwood soil differs from the Westland pakihi in containing a large amount of fine white quartz sand, which works up to the surface and gives a characteristic appearance to the ploughed land (see photo). Both Westland and Collingwood soils are sour moorland soils extremely deficient in lime and phosphoric acid. The obvious treatment is, therefore, first to plough the land and allow it to remain fallow for some months, in order that sourness may diminish by natural

F. G. Gibbs, photo.] VIEW OF PINE-STUMPS EXTRACTED.
Foreground fertilized with phosphates. Cocksfoot. Background virgin manuka country.

means. A good dressing of ground limestone or lime (2 tons limestone or 1 ton lime per acre) should then be applied, followed by a heavy dressing of some insoluble phosphate (5–10 cwt. per acre). Basic slag would seem to be an ideal fertilizer, though its cost is higher per unit than that of guano or ground phosphate rock. Experiments should be made with the various insoluble phosphates to ascertain the most suitable form in which to apply them.

In company with Mr. Gibbs, in the first week in September I had an opportunity of visiting the Onakaka experiments (Block II, Section 89, Waitapu). This being a winter inspection, when growth is naturally at a minimum, the experiments were at their worst.



B. C. Aston, photo.]

PLOUGHED AREA OF PAKIHI, SHOWING WHITE QUARTZ SAND WASHED OUT OF THE SOD, ALSO VIRGIN MANUKA IN BACKGROUND.

One was, however, struck by the abundance of *Leguminosæ* (chiefly *Lotus*) and the absence of moss on the half-acre plot which had received the greatest dressing of phosphates. This plot had received 1 ton of quicklime and ½ ton of insoluble phosphates in the form of basic slag, guano, and bonemeal, with a very small amount of dried blood and potash salts. The other manured plots, which had received about one-half the quantity of phosphates and lime, showed much moss and comparatively few pasture plants. In the middle of the area half an acre was unmanured, though treated otherwise exactly as were the other plots in tillage and seeding. This was almost bare of vegetation. The accompanying photo (taken in summer) gives some idea of how it looks. Growing on the land before breaking it in was a growth of manuka (*Leptospermum scoparium*) about 6 ft. to 10 ft. high, with a subgrowth of the fern (*Gleichenia dicarpe*) so abundant on the pakihi. On the wetter portions of the terraces there are buried stumps of the yellow-pine and rimu (*Dacrydium Colensoi* and *D. cupressinum*), which for some reason have long since died out. These stumps are removed with some difficulty, but, happily, are not distributed throughout the whole area.

In the valleys and wetter parts of the pakihi the flora is almost wholly a rush-like sedge (*Cladium teretefolium*). Thus the three dominant plants of the pakihi are the manuka, the *Gleichenia* fern, and the sedge. The two former are practically untouched by stock, and yet large numbers of cattle not only winter on the pakihi but thrive there. It is undoubtedly *Cladium teretefolium* which supports them, as they can be seen at any time browsing on it. In the summer it is said to be innutritious—a somewhat remarkable fact, if true.

Summary: There seems to be every hope of reclaiming the waste moorlands of Collingwood known as pakihi, provided that cheap ground limestone or quicklime and phosphate are available to farmers.

Hay for Calf-feeding.—There is hay and hay, and this should be specially remembered in the feeding of calves. Calves over five weeks old may be given hay with advantage, as there is nothing better to build up a good digestive system. Hay used for this purpose should be good. Only sweet meadow hay (preferably made in the cock) should be used, but, as this is not always procurable in New Zealand, hay with as little fibrous matter in it as possible should be employed.—*W. Dibble.*

POISONOUS POTATOES.

B. C. ASTON, F.I.C.

IN the August number of the *Journal* (p. 214) a note was inserted at the last moment before going to press regarding an unusual case of poisoning by potatoes. Since then a well-known Wellington scientific man has reported to me that his children have been made unwell by eating potatoes. Other complaints have reached me from vendors of potatoes that consumers have complained of the unpleasant bitter taste, and that the industry of potato-growing was liable to become affected, and have asked that the matter should be investigated.

Samples of potatoes sent in certainly tasted nauseous and left an unpleasant feeling at the back of the palate. One sample justifiably complained of was not green, another was green, but all the samples had sprouted. There was otherwise nothing perceptibly abnormal in the look of the tubers, which were full-sized and apparently healthy. A chemical investigation is now being carried out, supplemented by experiments on small animals.

The object of this article is to draw attention to the matter in the hope of obtaining more local information in regard to it. Those experiencing unpleasant taste in eating apparently sound tubers should discard the remainder; green potatoes should certainly not be eaten. Discarded potatoes would be best used as seed. In any case of poisoning the symptoms should be carefully noted, an important point being to discover whether the pupils of the patients' eyes are dilated. A few pounds of potatoes should be sent in for examination, together with a letter detailing all the circumstances of the case, such as origin and variety of the potatoes, symptoms, and the evidence generally which leads the inquirer to suspect the potatoes.

The following account is taken from Taylor's Medical Jurisprudence :—

POTATO POISONING.

The potato is too well known as a domestic vegetable to need any description, but it is not so well known that this edible tuber is the product of a plant in all parts of which a very poisonous alkaloid exists. The plant is a Solanum, and the alkaloid solanine is to be found in the flowers, stems, seed, and even in the "peel" of the potato itself.

Cases of poisoning by this means are very rare indeed, but the following suspicious case deserves to be put on record. It is contained in a letter from F. Wallis Stoddart, Public Analyst, Bristol, to Sir Thomas Stevenson, dated 27th August, 1902, and runs as follows:—

"Two children in succession died in one house after a short illness. The first was *in extremis* when seen, and, as the post-mortem revealed nothing, was decided by the medical attendant to have died of 'ptomaine poisoning.' However, when the second case occurred suspicion arose, and an analysis was ordered. The symptoms were very indefinite—some vomiting, history of one or two convulsions, general sort of collapse, and failure of the heart. I was told 'one pupil was slightly dilated,' whatever that means. The viscera were very carefully removed, and the stomach and intestines opened by me in presence of the doctor. There was a little diffuse reddening of the lesser curvature of the stomach, and an injected condition of the lower large bowel, which last, I think, was caused by the tube of a syringe used to wash out the bowel during life. There was no solid matter whatever, but the whole mucous surface was coated with what I found to be a sort of emulsion of castor-oil, a dose of which had been given. I received, however, also some undigested matters washed out of the rectum before death, and described to me as gooseberry-skins. There were some of these, also pips, &c., but most of the pieces were potato-skin and thin flat slices of the starchy tissue such as is removed in peeling. There was evidence also of some germination in one of the 'eyes.' I could find absolutely no poison except a little of our old friend copper in the liver, and gave a very guarded opinion that death was probably due to solanine poisoning, due to eating raw potato-peel; but I feel very far from confident about it."

On the occurrence of solanine in the potato, as described in Kunkel's "Vergistung," Mr. Stoddart remarks,—

"The large increase in solanine in 'bad' potatoes is odd. The fact that the alkaloid occurs in quantity in the tissue immediately under the skin is of special interest to my case, as this part, the white portion of the 'peel,' was present in large proportion to other matters. The only point of discrepancy I note is that dilatation of the pupils seems a common symptom in poisoning by potato, though doubtfully characteristic of solanine. In the Bristol case the doctor reported that 'one pupil was slightly dilated,' but that is not very definite, to my mind."

On this case the *Lancet*, ii, 1902, p. 693, thus comments:—

"It is undoubtedly the case that there is a time when the potato may contain an important quantity of poison, and this appears to be when the tuber has begun to germinate and to shrivel. In that case the solanine has been found chiefly in the peel and at the root of the eyes or shoots. An interesting account of the symptoms produced by eating diseased potatoes appeared in the *Lancet* as far back as 1846 (February 14th, p. 190). A peculiar affection was invariably traced to the use of diseased potatoes, being ushered in by rigors, hot skin, quick pulse, and abdominal pain. In the next stage rose-coloured patches appeared and as suddenly vanished, and in the majority of cases diarrhœa supervened; in the third stage there was a swollen state of the muscles of the neck, shoulders, and arms, with pain so acute that the patient winced on the slightest pressure. Inability to raise the arms, pains in all the bones, a red erysipelatous state of the face and skin, with œdema of the eyelids so as nearly to close them, were also observed. Ten cases of this affection had occurred in three or four days in the same locality (in Ireland), and all were similarly affected. The case recorded recently need give no grounds for alarm, for an actively poisonous potato is quite a rare specimen. The poison, however, probably appears normally in the tuber in very small quantity, but this quantity may increase to a poisonous amount in the sprouting, shrivelled, or diseased potato, and then most of it is found in the skin and eyes. In any case diseased potatoes would be naturally avoided, and they are generally discoloured. The risk, of course, would be greater when such potato is eaten with, as it is often cooked in, its jacket."

"The methods of determining solanine in potatoes have been improved by Professor Schmiedeberg and Dr. Meyer in Strasburg, but no case of poisoning by potatoes has hitherto been described where a quantity of solanine sufficient to produce decided symptoms has been found on chemical analysis. Professor Pfuhl, chief of the hygienic laboratory of the Army Medical Academy of Berlin, has recently published in the *Deutsche Medicinische Wochenschrift* a series of cases occurring in a regiment of the garrison of this city. Between May 29th and June 1st

fifty-six men of this regiment were reported ill, the symptoms being those of acute gastro-enteritis. The disease began with a rise of temperature to 38° or 39·5° C. (100·4° or 103° F.), headache, colic, diarrhœa, and general debility. In some cases there was vomiting, in others nausea only; several fainted, and one man was seized with convulsions. The majority were drowsy and apathetic; on the following day their conjunctivæ were yellow, and in one case there was general jaundice. A number of patients complained of a tickling in the throat, the mucous membrane of which was slightly swollen. Other complications were herpes labialis and salivation. There was no mydriasis. The fever continued until the third day. There were from four to six motions of the bowels each day, the fæces being diarrhœal in character and containing pieces of undigested plums which had formed part of the men's dinner, but no potatoes. In two cases the fever reappeared after two days, but after one or two days the temperature became normal again. The men were kept in bed and were treated with abdominal wet packs, three-decigramme doses (four and a half grains) of calomel, and afterwards with laudanum. Nearly all recovered in a few days. It was found that on May 29th, being Whit Sunday, a portion of their dinner had consisted of plums and potatoes, the potatoes having been quite recently supplied to the kitchen of the company. The plums proved to be normal, and the potatoes were therefore carefully examined. They were large, white, round ones, comparatively few of which had sprouted. They had been boiled for twenty-five minutes. On chemical analysis of the potatoes solanine was found to the extent of 0·38 part per 1,000 in the boiled and 0·24 part per 1,000 in the raw. On an average every man who fell ill had 0·3 gramme (four and a half grains) of solanine, a quantity sufficient to produce toxic effects. The rest of the potatoes were, of course, not used; and accordingly no other cases of poisoning occurred." (*Lancet*, ii, 1899, p. 1554.)

SILVER-BEET.

COMPREHENSIVE experiments in connection with silver-beet are to be conducted at the Ruakura Farm of Instruction and the Moumahaki and Weraroa Experimental Farms this year. The main objective is to test the feeding-value of the plant in the North Island, and thereby to assure the accuracy of the results of tests conducted last year, principally in the South Island. The seed of the varieties that were most successful last year are being used for the purpose, and the Department has also obtained a number of other varieties which will be tested at the experimental farms this season.

In view of the great interest being taken in the cultivation of silver-beet for stock-feeding purposes, the Department has decided to issue a bulletin on the subject. This publication will be a revised and enlarged edition of the article which appeared in the June number of the *Journal*. Any one desirous of obtaining a copy of the bulletin should make application to the Editor, Department of Agriculture, &c., Wellington, when a copy will be duly supplied.

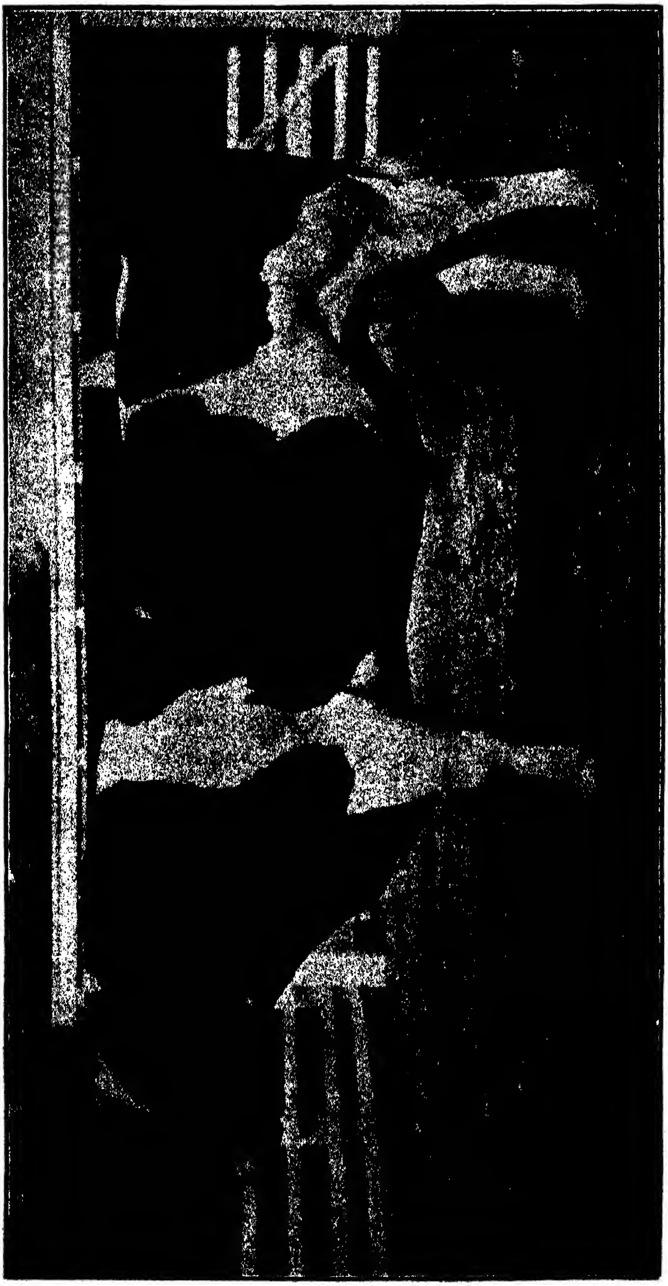
Agricultural Show Dates.—Manawatu and West Coast Agricultural and Pastoral Association. Palmerston North, 5th 6th, and 7th November Northern Wairoa Agricultural and Pastoral Association, 21st February, 1914.

REARING THE DAIRY SIRE.

THE WERAROA METHOD.

THIS year's draft of yearling Holstein bulls from the Weraroa Experimental Farm is the most attractive-looking collection of juvenile sires bred by the Department at its Holstein breeding centre. With the object of securing that special consideration in a sire of heavy-producing milking-stock—soundness of constitution—the calves have been fed well and handled carefully from birth, without being unduly pampered.

For the first forty-eight hours the calves were left with their dams — this in order to make sure of the calves securing the essential colostrum milk (a natural process which also lessens the risk of the cow taking milk-fever), any surplus milk being, of course, drawn off. For two weeks after this the calves were given half a gallon of whole milk three times a day. At three weeks of age whole milk (a gallon) was given twice a day, and, after the milk, ½ lb. of dry crushed oats morning and evening. This ration was continued for six weeks. Then the whole-milk supply was gradually decreased, according to the nature of the season, and the oats were replaced by a mixture of 3 lb. of wheaten chaff, 1 lb. of pulped mangels, and ½ lb. of pea-meal, the whole being mixed with a cupful of linseed-jelly (prepared by pouring boiling water on linseed and allowing this to stand overnight). This allowance was continued till the calves were from four to five months old, the calves having also the run of sweet young grass. From then up to eleven months old (practically the winter period) the following ration was fed: mangels 4 lb., wheaten chaff 5 lb., wheaten meal 1½ lb., cotton-seed cake ½ lb., steeped linseed ½ lb., the proportion of cotton-seed cake being reduced in the case of the younger calves. This daily ration, mixed on the floor of the feeding-room and fed in troughs in the stalls, is divided into five parts, two parts being given in the morning, one at midday, and two in the evening. With the exception of the cotton-seed cake all the ingredients were produced on the farm. During the daytime, in all weathers, the calves are grazed uncovered on good pasture. At night they are kept in open-fronted, roomy stalls, well bedded, and



OAK DE KOL.

The sire of the majority of this year's draft of Weraroa Milk-record Holstein bull calves.

DOMINO OAK DE KOL.
One of the yearling Holstein bulls to be sold at Weraroa on 4th November.

are supplied with good hay in racks. Rock salt is kept before the calves in boxes in their stalls, and water is supplied in troughs in the fields.

The general robust and vigorous condition of the young sires at the present time proves clearly that the cost of the special feeding has been more than justified. The treatment has certainly been the most successful yet tried at Weraroa. It has given the calves a good start in life by building up a good digestive system, evidence of which has been the entire absence of stomach-worms and scouring, and has thus laid the foundation of a strong constitution. So well developed are these young bulls that they will be fit for service at twelve months of age. Indeed, at the present time the ten-months-old calves look more like ordinary two-year-olds. A type of the Weraroa yearling Holstein bulls of this year and a view of their quarters are here illustrated.

SEMI-OFFICIAL TESTING.

STATEMENT TO 10TH SEPTEMBER, 1913.

W. M. Singleton.

The statement on the following page regarding the yield of a number of purebred Jersey and Holstein cows should prove of interest to the progressive dairymen of our Dominion. Outside the herds of public institutions this is the first statement of authenticated yearly records made by purebred dairy cows in New Zealand. The support which has been accorded the movement has been most gratifying to those who believe that a yearly butter-fat record is the best hall-mark that can be given a cow of recognized good breeding.

When it is recognized that this is the first instalment of the first season's results, and that little or no preparation could be made by owners before these cows commenced the test, the results are very creditable indeed. In a number of instances cows under test grazed with the other cows in the herd, getting no special treatment until possibly toward the latter end of their season.

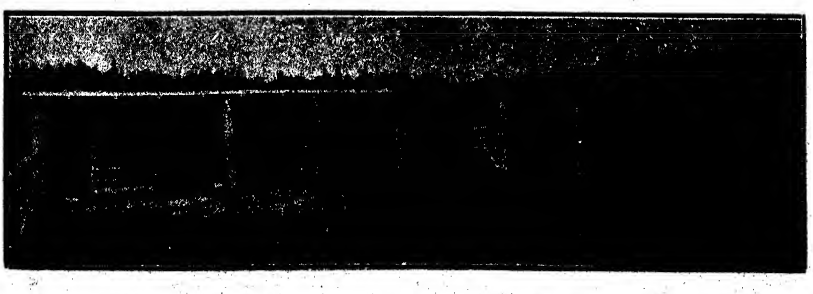
All these cows have dropped a calf within fifteen months after commencing the test. Details regarding dates of calving, &c., would be interesting in connection with many of these records, and would evidence greater powers of performance than the mere figures

indicate. However, the owners concerned will probably see that "their light is not hidden under a bushel."

Name of Cow.	Name and Address of Owner.	Age of Cow.	Yield for Season.		
			Days.	Milk.	Fat.
	JERSEYS.	Y. D.			
Belvedere Rose ..	R. J. Linn, Normanby ..	3 19	294	8598·5	451·68
Silver Maid ..	Dr. F. J. Watson, Bull's ..	Mature	312	7246·75	419·82
Charmer of Bulls	,, ,, ..	2 296	358	7119·50	413·20
Fitzwilliam's Fancy	R. J. Linn, Normanby ..	3 35	320	6376·00	413·06
Pearl's Pride ..	Dr. F. J. Watson, Bull's ..	Mature	320	6160·75	403·42
Silver May ..	C. Goodson, Hawera ..	,,	296	7175·50	391·61
Bridal Bouquet ..	J. D. Healy, Stratford ..	2 342	320	5393·00	363·15
Lady Carolina* ..	T. Foreman, Alton ..	4 347	285	5495·50	362·34
Genoa Daisy ..	A. and J. O'Donnell, Inaha	Mature	326	6933·50	360·32
Leta	H. McKenzie, Waitara ..	2 357	303	7463·50	344·06
Rewa Freesia ..	W. H. Booth, Carterton ..	3 357	277	6149·60	330·48
Glorie de Dijon III	A. and J. O'Donnell, Inaha	3 32	245	6615·00	293·40
Campanile's Palm	W. N. Stephenson, Tariki	2 30	269	4782·00	292·48
Dominion Lovely's Gem	A. E. Missen, Rototuna ..	2 292	242	5405·00	287·35
Dorelia ..	E. S. Holdaway, Ballance..	2 59	319	5809·00	281·10
Belvedere Wild-flower	A. E. Missen, Rototuna ..	2 5	252	5167·00	249·24
Tiritea Bonnie Lass	E. S. Holdaway, Ballance..	1 320	295	4667·00	248·32
	HOLSTEINS.				
Gladys II ..	George Aitchison, Kaitangata	3 155	304	15788·25	614·00
Lady Rozine ..	Newton King, New Plymouth	Mature	324	14510·50	510·93
Countess of Galatea	,, ,,	4 290	333	12818·50	434·58
Lady Parthena ..	,, ,,	4 323	281	10655·50	382·58
Longbeach Leu-warden Ideal†	J. C. N. Grigg, Longbeach	Mature	205	11131·50	361·53
Julia	Weraroa Experimental Farm	,,	242	11931·50	359·40
Ella of Brundee ..	W. H. Bayliss, Mangatainoka	3 298	299	10193·50	331·59
Glendowie Dinah	C. C. Buckland, Cambridge	3 0	364	7361·25	306·29
Minnie of Brundee	W. H. Bayliss, Mangatainoka	2 109	295	7443·50	260·19

* Lady Carolina milked 44 days before commencing her record.

† Longbeach Leuwarden Ideal milked 88 days before commencing her record.



THE CALF-PENS AT WERAROA EXPERIMENTAL FARM.

POTATOES AND DISEASE.

LAST season was a most disastrous one for many cultivators of the potato; the havoc caused by disease (*Phytophthora infestans*) was widespread, and destroyed many promising crops. Certain remedies have been prescribed for this disease, and the most usual is the spraying of the haulm of the plant with Bordeaux mixture. It has been found that this method is to a certain extent efficacious, but I suspect that the potato crops could be rendered much more immune through the judicious application of certain artificial manures in addition to the ordinary natural manures generally used. One of the leading English potato-growers has stated that there is no such thing as a "disease-proof" potato. I am, however, not of this opinion, and I believe that within the next decade a race will be evolved which will withstand disease. It is only a matter of scientific and careful breeding and selection. For the last two or three seasons I have been experimenting with a variety of potato which readily contracts disease, and certain treatment in the way of manuring has given me excellent results. I am convinced that potash applied to the soil is an almost certain preventive of disease. Potassium fertilizers are known to promote a short, sturdy growth of the haulm, and this result alone materially increases the plant's power of resistance to disease. The mycelium of the fungus which causes potato-disease is known to penetrate the tissues of the foliage, which it subsequently destroys. The effect of the potash is to enable the tissues to resist the entrance of the germ-tubes, which, emitted by the zoospores, normally penetrate the epidermis of the tuber or foliage. The subjects upon which they operate are in a harder and more solid state, and this enables them to resist the development of the spores. The foliage, particularly, becomes so tough and leathery that it is quite immune to the action of the disease germs. A plant like the potato, rich in carbohydrates, requires large quantities of potash in the soil. Last spring I treated a small plot of ground, which had been liberally supplied the previous autumn with animal manure with a top-dressing of sulphate of potash, and planted it with potatoes. In the same environment another plot of ground (also liberally manured, but not treated with potash) was planted with the same variety of potato. In the autumn, when the crop was raised, there was no disease on the plot treated with the artificial manure, while on the other there were diseased tubers on almost every plant. About a fortnight after the plants began to show through the soil another top-dressing of potash was given; and the strong, tough, hardy foliage of the potash-treated plants stood out in marked contrast with those which were not treated. So far as quality is concerned the potash-treated plot yielded tubers which were appreciably finer in this respect. The season was a good one for a test of the kind, and was certainly favourable to the spread of disease. I have found sulphate of potash (K_2SO_4) much the best form in which to apply this manure, and, as it is a crystalline salt, it is readily soluble. It usually contains from 46 per cent. to 52 per cent. of potash (K_2O), and I think the best form of application is by way of a top-dressing at planting-time, followed by another application about two weeks after the shoots appear above the soil. In using this manure, I think sulphate is safer than muriate of potash, because when the latter is used as a top-dressing there is considerable danger if it comes into contact with the plant. Muriate of potash is best applied to the soil during winter. Kainit is not sufficiently rich in potash to be of any value for this particular purpose. I am well aware that the use of potash is injurious when applied to some soils, owing, no doubt, to its action upon the calcium carbonate present in them. Then, many clay soils simply require some agency to release the potash which is already locked up in them. My own experience is limited to a light, loamy soil, but I give it in the hope that it may be useful to others, who might test it for themselves and endeavour to discover, if possible, the exact amount of potash required for effective treatment. Potash is usually a constituent of all suitably compounded artificial manures for potatoes, but it is not present in sufficient quantity to be of very great value in warding off disease. The Board of Agriculture, for example, recommends the following mixture as an artificial manure for potatoes: ½ cwt. nitrate of soda, ½ cwt. sulphate of ammonia, 2 cwt. dissolved bones, 2 cwt. superphosphate, 1 cwt.

sulphate, or muriate, of potash. The quantity to be used per acre is given as from 5 cwt. to 8 cwt., if supplemented with a liberal dose of animal manure; or if without the latter, double the quantity of artificial may be used. The Board, it is worth noting, does not recommend a top-dressing of artificial manure for the potato crop; but this is precisely where I have found potash to be of the utmost value. Further experiment on the lines I have indicated would seem necessary before any particular quantity of potash per acre can be recommended as ensuring the best results.—*George M. Taylor, Midlothian, in the "Gardeners' Chronicle."*

NOTE.—Mr. Aston, Agricultural Chemist to the Dominion Government, strongly advises caution before accepting as applicable to New Zealand soils any method of manuring found suitable for lands in Britain. The system advocated in this article of top-dressing potatoes at intervals with potash salts in order to ward off disease is, however, worthy of a trial on an experimental scale, taking care that the seed shall have been manured with a good supply of phosphates. (See article on potato-manuring—*Journal*, Vol. iii, p. 55.) The action of potash salts in enabling a plant to resist disease was pointed out in an article on fertilizers by Mr. Aston (*Journal*, Vol. iii, p. 466) as follows: "Potash greatly assists the formation of carbohydrates, such as starches and sugars, lengthens the growing-period, and increases the disease-resisting powers of all plants, its beneficial effects being more noticeable in light sandy or humus soils."

At a recent meeting of the Waverley branch of the Farmers' Union it was decided that members pay periodical visits to the Moumahaki Experimental Farm and discuss operations with the Manager.

Errata.—On page 159 of the August issue of the *Journal*, in the article entitled "Wheat Tests at Moumahaki," the weight of straw chaff for Langmoor Solid-straw Tuscan and Rieti wheats should read "2 tons per acre" and "1 ton 16 cwt. per acre" respectively (figures approximate).

During a recent inspection of the Mackenzie country I was very much struck by the important part nature is playing in regrassing the land. The native herbs and grasses were seeding luxuriantly. The reason was not hard to find. Most of the country was not stocked at all, and the remainder of it was only half-stocked, thus giving the native plants an opportunity to seed. I am convinced that by reason of this understocking during the last spring and summer a good effect will be very noticeable for several years to come. Among the native grasses that were seeding well I was glad to notice the blue-grass, which appeared to be growing well in places where it has not been seen for years. These remarks do not apply to country on which rabbits are numerous. In these cases the grasses would have little chance of seeding.—*H. T. Turner (Canterbury).*

THE HEMP INDUSTRY.

W. H. FERRIS.

It was very satisfactory to all concerned in the work of grading phormium fibre to note a general improvement in the character of the parcels forwarded for shipment during the past month. It was not only that less fibre from diseased hemp was in evidence, but the general work of milling, especially in stripping and scutching, showed a distinct advance. The proportion of good-fair was much higher than it was for the whole of last season. No doubt the increased margin in market value between good-fair and fair, which has been up to £4, has been largely responsible for the better work. It is now paying the miller well to aim at the better quality. That the cordage trade is appreciating the good-fair standard is a hopeful sign, but unfortunately it cannot secure all it needs of this grade. Thus an opportunity is being lost in several quarters of having phormium fibre adopted for the manufacture of the best descriptions of binder twine, as other fibres must, as a result of the insufficient supply, be used in its place. If a supply of a commodity cannot be secured, it is a natural consequemce that it will be neglected and be finally displaced by rival materials.

While the proportion of good-fair fibre has increased, there is still a good deal of inferior-fair quality hemp being turned out, and this by millers who have good leaf and are working with up-to-date mills. In several cases which have come under my notice the reason was found to be that the men in charge of the stripping-machines did not understand their work, a bad thing for the industry but worse for the employing miller. This poor stripping is especially disastrous in such a district as Southland, where the leaf in general is short. Failure to strip well to the tips means that if an attempt is made to overcome the defect by scutching, the fibre is made shorter still. Manufacturers are complaining of the rough and short nature of the fibre in question, whereas if the milling were carefully controlled the want of length would not be nearly so apparent.

The new season is being entered upon with confidence. The season's crop of leaf in the Manawatu is a decided improvement on that of last season, and with prices still on a very payable basis

every effort is being made to work the mills at their maximum capacity. This, and the present tendency to aim at a good standard of fibre, points to a record season.

In some districts the tow being sent forward for shipment is still very unsatisfactory, being badly shaken and of poor colour. This is to be regretted, especially as the market for this by-product is weakening in sympathy with a decline in the market value of jute.

A good number of new and thoroughly up-to-date mills will be in operation this season, principally in Westland and Southland. Several new ideas having for their objective improvement in the present method of milling the fibre and economizing in this work are being experimented with. In more than one case encouraging progress is reported.

In future official monthly returns of the hemp exported distinction will be made between high- and low-pointing parcels in the two principal grades, thus high pointing and good-fair will be shown in a separate column from low pointing, and the same thing will apply to fair.

The grading-staff has been strengthened by the appointment of Mr. Adam Hall, of Invercargill, a miller of considerable experience and recognized as a competent authority on the production of phormium fibre. Mr. Hall was selected by the Department to install a phormium-fibre milling plant for the Imperial Government at St. Helena, where he remained for some three years instructing the islanders and directing the establishment of the new industry. Since his return to New Zealand Mr. Hall has been milling on his own account in the Southland district.

TOP-DRESSING FOR PUMICE SOILS.

As a pasture-dressing for pumice soils I can confidently recommend a mixture of basic slag and superphosphate in equal parts—4 cwt. per acre. This will probably be superior to either constituent applied singly, especially on "bush-sick" country. The mixture should be applied as directed in Bulletin No. 26.—*B. C. Aston.*

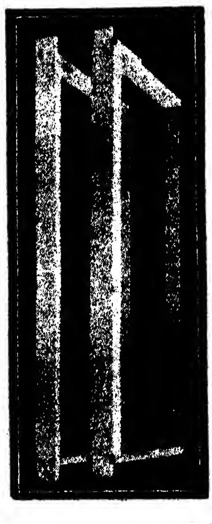
New Zealand seed-merchants, it is stated, have purchased virtually the whole of the European output of silver-beet seed. This sudden demand has come as a great surprise to European growers, who hitherto have restricted their trade to the production of seed for market-garden purposes.

THE APIARY

F. A. Jacobsen.

A Universal Hive.

It will be admitted in these days of specialism and the accompanying necessity of practising economy in all the details of a business that a hive of a universal pattern is much to be desired. In the first place, if all beekeepers throughout the Dominion are using the one pattern the first cost of the hive will be considerably reduced, as turning out only the one size necessarily enables the manufacturer to produce it at a lower cost than where several sizes have to be made to suit clients demanding a variety of patterns, and so on with some of the hive-fixings. Thus a universal hive would be a direct financial gain to the beekeeping community. Again, in purchasing and in disposing of apiaries it would be a very great convenience, and generally would be a saving both of time and of money. It would appear that the ten-frame hive is the one that would prove most suitable for general use. Several beekeepers are favouring the twelve-frame pattern, and while this has given satisfaction in certain localities it has several drawbacks which prevent its general acceptance. In the first place, it is too heavy for women apiarists and for those not naturally strong, to whom beekeeping is proving a popular means of livelihood. Then, it is too large for some localities. Altogether the twelve-frame hive cannot meet with general acceptance, and therefore is not to be recommended in view of the undoubted advantage of a universal hive from an economic standpoint.



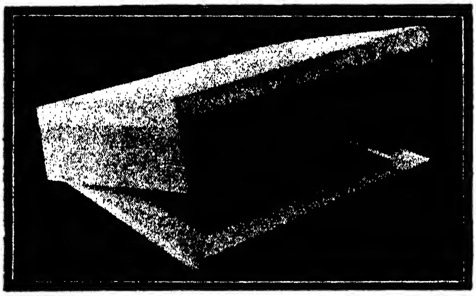
The Ideal Frame.

After several years of inspection-work and the handling of almost every kind of frame, it is obvious that the staple-spaced kind meets with the most approval. It is to be recommended both for its simplicity and for its efficiency. In districts where the bees use much propolis this frame may be handled rapidly and without any breakages, for it is impossible

for the bees to propolize one frame to another. This feature alone should recommend it for universal use, as in a large apiary a considerable amount of time is saved in manipulating colonies. In place of the wooden projecting shoulders for the purpose of self-spacing, as in the Hoffmann frames, the end bars are the same width all the way up, and the places of the shoulders are occupied by small staples, which are driven into the wood $\frac{5}{16}$ in., one on each side of the top bar. Thus, whichever way the frame is inserted in the hive, the correct spacing-distance is gauged by the staple.

COVERS.

The Department has for a considerable time recommended the use of the zinc-topped, flat, telescope cover. This kind is excellent in all respects, being warm in winter and cool in summer. It telescopes 3 in. over the body of the hive, and there is a 1 in. space over the frames. It is perfectly waterproof, and does not warp. It is especially handy when manipulating colonies during a dearth of nectar, when bees are inclined to rob, as the flat surface provides an excellent lodging-place for supers. Some of the most extensive bee-farmers are now adopting this style, as its neat appearance and general usefulness give it a decided advantage over all others. A wood mat is often used with this cover.



A SPRING REQUIREMENT.

There is no more critical period in bee-farming than the spring, and with adverse weather-conditions, which make it very improbable that bees will gather nectar, the welfare of the colony must be watched closely. As coinciding with former instructions, keep a sufficient supply of food in the hives to enable breeding to proceed freely. If this be done, every fine sunny day will record a great difference in bee-activity, and the animation of the colony will the sooner be restored.

THE SELECTION OF A QUEEN FOR BREEDING.

It will soon be time to think about rearing young queens to take the place of old or slow breeders; consequently watch your

stock and choose a prolific strain from which to breed. A well-marked queen that lays her eggs in a solid mass covering two-thirds of each side of a comb, and whose bees show gentleness and good honey-gathering qualities, is the kind to select. If she produced pure drones the previous season one may conclude she has been purely mated, as sometimes a mistake can be made when judging by the bees only.

When many are to be reared, choose several from which to breed of this kind, and in time your colonies will be vastly improved. Methods of queen-rearing were given in the *Journal* at this period of last year. Mention was then made of the Alley plan, which is a suitable method for all beginners.

Notes.

High prices are more the result of quality than quantity.

When in doubt the novice should consult some man of experience.

Aim at keeping your apiary entirely free from disease. Cleanliness is the best preventive.

Experience is essential in establishing a commercial apiary, and this must be combined with capital. Many failures are made in buying experience too dearly.

SELLING BEES.

It has several times come under the notice of the apiary officers of the Department that persons have attempted to sell hives which are infected with disease. It is desired to impress upon all beekeepers the fact that any person selling diseased bees is liable to a penalty of £5. Persons desirous of selling their bees are advised to apply to the Apiary Instructor for the district, and obtain his certificate before doing so.—*T. W. Kirk.*

One hundred acres of the Ruakura Experimental Farm have been sown to the Ruakura rust-resistant oat.

A very large quantity, far greater than in any previous year, of phosphorized pollard was made at the depots of the Department and was sold to settlers during the past year. As poisoning is now being regarded as the most effective means of coping with the rabbit pest, good results should be recorded this year in the work of suppression.—*H. T. Turner (Canterbury).*

ORCHARD WORK FOR OCTOBER.

W. A. BOUCHER.

CULTIVATION.

THE cultivation of orchards that have been planted in heavy lands requires careful attention, especially during the early part of the season. If the ploughing be left too late—in fact, until the soil has become dry this may be found to be almost impossible to pulverize thoroughly. In any such instance the result would perhaps be worse than if no ploughing had been done, for if a dry season be experienced the loss of moisture would possibly be greater from ploughed land that will not pulverize than from the same land left unploughed.

FUNGUS DISEASES.

Apple-scab (Fusicladium dendriticum), Pear-scab (Fusicladium pyrinum), and Apple-mildew (Podosphæra leucotricha).—Spring weather such as is frequently experienced in October proves favourable to the development and rapid spread of most of the fungus diseases that attack fruit and fruit-trees. Measures taken to prevent attack as far as possible are the only ones that are really satisfactory. It has been pointed out previously that the same climatic influences that induce the swelling of the buds on orchard-trees also induce the development of the dormant germs of the various fungus diseases that cause much trouble and sometimes considerable loss to the grower. It is therefore essential that such treatment should be applied as will severely check the above-mentioned diseases in an early stage of development. For this purpose nothing has yet been found that has proved to be quite equal to the Bordeaux mixture—10-10-40 formula. Many other compounds have been tried and discarded, because, being very soluble, they were readily washed from the trees by the first shower of rain that fell after the trees had been sprayed. With such climatic conditions as are usual in most parts of New Zealand only a compound that will adhere in spite of rainfall can be regarded as being in any way satisfactory for the prevention of attack by fungus diseases.

Canker (Nectria ditissima). A number of specimens have been received and inquiries made regarding this disease. In any orchard where it has been found a careful examination of the trees should be made from time to time during the spring, and all affected twigs or limbs removed, care being taken to cut back to clean healthy wood and burn all diseased cuttings. This method of treatment, combined with the systematic use of the Bordeaux mixture, will prove effective in speedily eradicating this disease from an orchard.

Insect Pests.

Mussel Scale and Red Spider.—Reference to these pests is made in order to point out that effective measures for their control should have been taken earlier, and also to warn growers against using the home-prepared red-oil emulsion or the ready prepared miscible oils at the winter strength when the buds have commenced to swell. Unfortunately, letters are received from time to time indicating that injury has been caused to trees that have been sprayed either too early in the autumn or too late in the spring. However—but this will apply more to the domestic than to the commercial grower—if by any mischance spraying has not yet been carried out for the control of these pests, the kerosene emulsion applied when the young insects are on the move will be found to be an effective remedy.

Kerosene Emulsion.—A spring and early-summer remedy for scale insects when on the move, and thrip on citrus and deciduous fruits. Proportions: Kerosene, 2 gallons; common soap, ½ lb.; boiling water, 1 gallon. Preparation: Place the soap in the water, which should by preference be rain-water. Hard water is unsuitable, but if only such is to be had, make it soft by adding some soda. Boil till the soap is thoroughly dissolved; then take it off the fire and pour the solution into the kerosene; thoroughly churn up by placing both suction and delivery ends of the spray-pump hose in the liquid and pumping steadily for a few minutes. The emulsion should then, if perfect, form a cream which thickens on cooling without any appearance of free kerosene. For most plant-lice (aphides) and other soft-bodied insects, such as scale insects, when on the move, from twelve to twenty parts of water are added to one of the emulsion.

Codlin-moth.—In many districts of this Dominion the codlin-moths will be on the wing before the end of this month, although not in large numbers. Of late years a vast amount of good work has been done and considerable sums of money spent in reducing

the ravages of this pest. Growers should therefore avoid the possibility of any increased percentage of fruit being attacked by the moth. It has come under observation that in some instances, owing to the use of brands of arsenate of lead deficient in insect-killing power, not only the larvæ of the codlin-moth but those of other troublesome eating-insects have escaped destruction in spite of careful spraying. It cannot pay any grower to purchase an inferior brand of arsenate of lead, thus saving a trifle in the cost per pound, only to find later, after the necessary sprayings have been effected at considerable expense for labour, that the percentage of unmarketable fruit is unduly high. Spraying for codlin-moth should commence as soon as possible after the petals have fallen. To delay this first spraying is to invite results more or less unsatisfactory, especially in the case of many varieties of pears, for, should the calyx have closed before the first application of the arsenate of lead has been made, a considerable loss of crop will almost certainly ensue. Instead of using the combined spray for eating-insects and fungus diseases attacking the apple and pear, some growers now prefer to apply the arsenate of lead and the Bordeaux mixture separately. It is considered that under certain conditions of season and climate the combination of these spraying compounds may result in burning to a greater or less degree. Although the increased cost for the labour required to spray an orchard twice instead of once is considerable, some growers prefer to incur this rather than risk possible burning to fruit and foliage.

Woolly Aphis.—It is now very generally agreed that winter spraying with the red-oil emulsion has a decidedly beneficial effect in decreasing the virulence of the attacks by this pest. Further, if the winter spraying be followed by the painting of any colonies of aphis that may be noticed with the red-oil emulsion undiluted, young trees especially will remain for some considerable time free, or comparatively free, from the ravages of this most objectionable pest.

CITRUS FRUITS.

Scale insects on citrus fruits usually hatch out quite irregularly during the months of spring and early summer, so that scale on the move, as well as scale of greater age, will be found often in profusion. In the case of the black scale, which is common on citrus fruits in New Zealand, the protective covering remains soft for some time after the insect is hatched from the egg, so that the kerosene emulsion is effective at that stage of existence as well as against the younger insects.

Tomatoes.

This popular article of diet in most localities is subject to attack by both insect pests and fungus diseases. Spraying with the summer formula of the Bordeaux mixture and arsenate of lead as for codlin-moth will be found effective against these troubles. In spraying with the Bordeaux mixture special care should be taken to coat the under-sides of the leaves well.

GRAPE - CULTURE.

S. F. Anderson.

Vinehouse Work for October.

After reading the following notes on controlling the growth of the fruit-bearing shoot, the beginner in vine-culture under glass should confine his attention to one average rod, and follow the directions step by step. The growth will be very strong in most houses during this month. The thinning-out of the superfluous growth, or disbudding, mentioned in last month's *Journal*, will have accelerated the development of some of the shoots left. Where these have extended to four or five leaves beyond the bunch of young fruit they may be pinched off, leaving two leaves beyond the fruit, provided the growth be strong. If it be not strong leave three or four.

Should the growth made throughout the house be about the same, complete this work, but it may be that this cannot be done all at once. It is important, however, not to allow the growth to get too strong before the work is done, as it then becomes a severe check. This, then, is the first step.

A week or two after the preceding instructions have been complied with, the laterals will put forth another strong growth. This can be allowed to go on until another four to six leaves are made. Then pinch again, but leaving two more leaves—that is, four beyond the fruit. This is the second step.

A third and fourth pinching will be required, but at longer intervals, always leaving two leaves as advised above. After the second and later stoppings it will be noticed that the joints get shorter and stouter, and this stopping being done while the shoot is tender has not the same check on the vine as when left to a

later stage. While this stopping of the fruit-bearing shoot is going on, it will be noticed that the vine makes an effort to overcome the loss by sending out small side shoots from the one that has been stopped. These have also to be checked by pinching back to two or three leaves. Any further stopping depends on the vigour of the vine. By the time the fruit is fully grown, the shoot carrying it should be 30 in. to 36 in. long and be bearing from twelve to fourteen leaves.

From observations taken in many vinehouses and over a number of years, it has been noticed that where a vine-shoot has brought to maturity a bunch of grapes first rate in quality, size, and colour, the leaves on that shoot have been well developed and from twelve to fourteen in number. The average area of each leaf is about 16 in. The area of leaf-surface to bring about the best results in each bunch of grapes is, say, 16 in. by 14 in., or 224 square inches, which should be exposed to the light as much as possible. A certain amount of overlapping is inevitable even with vines planted 4 ft. and 5 ft. apart.

While on the subject of summer pruning and stopping of the vine a few remarks on the effect of depriving plants of their foliage during the growing season may not be out of place. Vines grown under glass, planted in a well-prepared vine border and forced by stimulating manure, are very vigorous. If, then, the vines be planted only 3 ft. apart (which they very often are) and the rod from each vine be putting forth from either side of it a lateral shoot every foot of its length, there must follow much overcrowding of foliage. To overcome this the vines have to be deprived of a large amount of their leaves. Owing to the vine's great vigour the first few years after coming into bearing, results may be obtained that are not possible later, for the reason that a few years of heavy defoliating so reduces that vigour that the new wood made becomes weaker and more spindly every season. It is therefore unreasonable to expect a continuation of good crops where the vines are overcrowded.

It is a great pity that the majority of farmers do not regard noxious weeds in a more serious light, and endeavour to grapple in an effective and systematic manner with the problem, instead of contenting themselves with keeping within the four corners of the Act. It is gratifying to know, however, that many farmers have done excellent work, and in some instances have completely eradicated weeds from their properties.
H. T. Turner (Canterbury).

THE FARM GARDEN.

W. H. Taylor.

Frame Cucumbers.

In the last issue of the *Journal* directions for raising plants were given, and also advice regarding the preparation of manure for the bed on which to grow them. A dung bed is a very useful ally when controlled by an experienced person, but it is apt to be vicious if not properly managed. The important point to remember is that turning should be continued until the rankness has been eliminated, and the heap is in a condition which is neither wet nor dry, there being just sufficient moisture to continue the process of fermentation at a gentle rate. When the bed is made up heat generally declines. The lights should be kept close for a day or two. Heat then rises, usually rather violently at first. Tilt the lights to let out the hot vapour. In a day or two it will settle down, and the bed may be got ready for the plants. Various recommendations are made in regard to soil, but they are not always in accordance with colonial circumstances. Home writers advise a proportion of old mushroom-bed manure for mixing with the soil. We do not possess that material, nor have we anything like it, for its preparation is peculiar. The use of ordinary manure is very dangerous; it may be all right, but its selection requires experience. I believe the best plan is to use no manure, but simply good loam. I have explained before that loam is turf cut from an old pasture, being full of grass roots, technically called "fibre." The turf should be taken from high ground, or at least from a well-drained place. The turf is stacked grass down until the grass and its roots are dead. For cucumbers the loam should be chopped up with a spade. It should not be too fine, and it would be better to discard soil that falls away than to have too large a proportion of it. About a bushel of loam should be placed under the centre of each light and be left a day or two until it gets warm before putting the plants in. Two plants are to be placed on each heap, which should be flattened down slightly on top. When the plants begin to make new growth the growing point should be pinched off each, in order to make them branch. When fruit shows on lateral growths the shoot should

be pinched one joint beyond the fruit, in the meantime training two or three stronger shoots as leaders to continue growth. When roots show through the sides of the heaps of soil more must be added, finally filling all the space. This should be done before the plants have run far, or it will be difficult to do it without causing injury. When the plants are beginning to bear fruit liquid manure should be given about every other day. The plants will require shading from bright sun, but very slight shade is sufficient and most effective, much shade making the plants weak, long-jointed, and comparatively shy-bearing.

Melons.

All the earlier steps for melons are the same as in the case of cucumbers, but it is important that the melon-plants be not shaded at all. They will bear hot sunshine through the glass, and revel in it. Melon-plants are trained differently from cucumbers. Two plants are put under the centre of each light. Pinch out the tops, and secure two branches to each plant. Lead a shoot across to each corner of the light. When a shoot has reached across the bed pinch the point out. Side shoots or laterals will soon appear, and it is these that bear the fruit. Melons in frames may or may not set without artificial setting. It is necessary, however, that all the flowers wanted to bear fruit be set on a definite plan. The reason is that in order to grow a reasonable crop of fruit the plants must be watered well and supplied with liquid manure. But the fruit will not ripen when there is much moisture in the soil: the melons would most likely crack open and go bad. Therefore, when the fruit is well grown water must be withheld so as to ensure ripening. Now, it is obvious that if there be fruit of different ages on the plant they will not be all ready to ripen at the same time. It is necessary on that account to have them all the same age: this is the way to secure them. As I have said, fruit is borne on the lateral growths. Six fruits to each plant is a good crop, three to each leading branch, each on a different lateral. Watch until a sufficient number, and a few to spare, of both fruit-bearing and pollen-bearing blossoms are all fully expanded at the same time. Take blossoms with ripe pollen and dust the fruit blossoms with the pollen. This work should be done near noon on a bright day. Before long it will be seen what fruit has set, for they soon begin to grow. When grown sufficiently to ensure their being all right, pinch off any there may be above the proper number, and grow the others on. When they are considered sufficiently grown, water is withheld and the fruit

will ripen. In a future article more may be said about this stage, and some advice tendered in regard to ripening off.

CURRENT WORK.

Celery plants raised under glass should now be ready for pricking off in other boxes. The boxes should have a layer of partly decayed strawy manure placed on the bottom, and should then be filled up with fairly rich soil. Prick out the plants about 2 in. apart, water them, and shade lightly until they begin to grow. All the time the plants are in the boxes they must be well supplied with water. Never allow them to get dry; make the watering thorough each time. They will absorb a lot of water while they are growing freely. Celery-seed may now be sown in the open ground to supply later plants. Be sure to sow in ground that is well manured, as they will not grow in a soil deficient in humus. When large enough the plants will require spacing out in the open ground. Let them get a good size first; then put them out in temporary beds. Plants should be 4 in. apart each way.

Prick off *tomato* plants in manner similar to that described for celery. Keep the plants close to the glass if in frames, or in a light position if in a house. If possible, arrange to have the plants in a position that will admit of ventilating, so that a current of air may pass directly through the plants. However, such free ventilation should not be given until the plants have made some growth. When growing the plants in frames at Weraroa we adopt the following procedure: Until the plants have made a good growth the lights are lifted at the top only, this being done by raising the lights and putting a block beneath to hold them up, not by sliding down. When more ventilation is required we push the light down a little way; then pull it aside slightly, so that the whole of one side rests on the dividing batten. The light is then open top and bottom. It is open in this manner only in good weather. The extra ventilation soon shows effect by toughening the texture of the plants.

Brussels Sprouts.—This plant requires a long period of growth. It is not until considerable size has been attained, with corresponding strength, that sprouts are formed. If seed be sown about the 15th September, with all the growing season of summer and autumn to come, it will be well towards the end of March before sprouts are ready. This is the proper time for them, as they are essentially winter vegetables. The plants should be treated liberally throughout. Prick off seedlings when large enough to bear handling into nurse beds of rich soil, and transplant finally into

well-manured ground before the plants get too large. Plant in rows 3 ft. apart, with a space of 30 in. between the plants in the row.

Parsnips.—Sow in land that was well manured last season for some other crop. A deeply worked soil of a free nature, with abundant humus, is necessary to grow good parsnips. Avoid fresh stable manure for this or any other root crops, because, among other evils, it tends to make the roots fork and grow side roots, the resulting produce being coarse in texture and poor in flavour. A light dressing of fertilizer may be given, such as superphosphate or basic slag, but it will not be required should the soil have been manured last season with stable or farmyard manure.

Carrots.—If the early sowing advised have been made, there is no real need for sowing again yet. By sowing early in November the main crop will be ready by the time the early bed is exhausted, and in good time for proper development. This also applies to parsnips when they are not required for use until summer vegetables, peas, &c., are past. Early in November is soon enough to sow, but I find many people, and also the markets, require them earlier.

Broccoli.—Seed should be put in from mid-September to mid-October. Being the most important of the winter and early spring vegetables, they should receive special attention. Varieties are very unreliable, except when obtained from the best sources. Seedsmen might with advantage find a way of making an improvement in the matter of varieties. Early, mid-season, and late sorts should be sown. Prick off into nurse-beds when strong enough, as advised for Brussels sprouts, after-treatment being the same as in the case of the sprouts.

Savoys require a longer period of growth than cabbages, so that, although the end of November is the time to sow for winter cabbages, savoy-seed should be sown in the latter half of September.

Cabbage and Cauliflower.—Seed of both put in now will provide late summer and autumn cuttings. Sow early varieties of cabbage, such as Flower of the Spring, Early Winningstadt, or Jersey Wakefield, and giant cauliflowers.

Lettuce should now be sown in lines thinly, and further thinned to about 9 in. apart. This method is better than transplanting during hot weather. It is, however, certain that many people will still transplant from beds, and when this is done it is the best plan to make shallow drills and plant in the drills. This avoids planting in the dry surface soil, and renders watering easy, the water being concentrated in the drills.

Radishes should be sown in small quantity about every ten days.

Turnips should also be sown in small area. They are fit for use for about eight weeks only during hot weather.

Sow *peas* fortnightly for succession.

Prepare trenches for runner *beans* in the same way as for celery, half filling the trenches with soil and planting the beans on that surface. The remainder of the soil is to be returned after the beans are well grown, and the sticks are in place. Runner beans and French beans may be sown early in October in a place of average conditions, a little earlier or a little later according to circumstances.

SMALL FRUIT.

Gooseberries. Where much cutting-out of branches has been done there is certain to be a lot of young growths push out. These, if left, create a nuisance by crowding the bushes. It is quite easy at this early stage to detect these young shoots, and equally easy to rub them off with thumb and finger. Thus much trouble will be saved, and growth will be directed to the proper channels. These remarks apply with equal force to *red* and *white currants*, and to a much more limited extent to *black currants*.

Raspberries.—Superfluous suckers should be destroyed as soon as they appear. Where the labour is done by hand the most economical method is to dig them out altogether, for if merely cut off they soon reappear.

Cape Gooseberries.—Make new plantations. The way of planting I prefer is three in a clump in a triangle, each plant about 6 in. from the other, and clumps 5 ft. apart. The three plants lock together and resist wind.

Mulch *strawberries* with the best material at command—rushes, spent hops, and coarsely cut straw chaff are all suitable, but not green grass. The last-named in decaying becomes mildewy, and is likely to taint the fruit.

FLOWER-CULTURE.

Flowering-shrubs.—It is usual to see flowering-shrubs either not pruned at all, or, what is much worse, cut back at the wrong time and without any design except restriction. There are, of course, many kinds of flowering-shrubs that do not require pruning of any kind, and some that require it only under exceptional circumstances. *Camellias*, for instance, rarely require cutting, growing, as a rule, in a form that requires no amendment. But it does sometimes happen that in old gardens trees are seen that have grown too high. In

such cases the growth is likely to get thin at the bottom, and the flowers are not effective through being above the line of sight. Such trees may be cut down to a reasonable height, the time to do it being soon after flowering is over. That is the time they make their growth. I have cut down trees that were 15 ft. high to about 3 ft., but they quickly made new growth and again formed good bushes. It is, in my opinion, best to leave untouched any side branches there are on the lower parts of the bush. *Rhododendrons* would not respond to such treatment; nor do they require it, for their flowers are well displayed even at a height. *Prunus pizardi* is really a fruit-tree, and there are a number of similar trees used for ornamental purposes—double and single cherries, &c. These trees are quite useless, and they present a very objectionable appearance if wrongly cut. They are better left alone than cut wrongly. If left alone they may run wild a little, but at least they will flower. The objects in pruning such trees are to preserve a symmetrical shape, perhaps to restrict the size of the tree, and to promote free flowering. The mode of pruning is almost the same as that for similar species that are grown for their fruit, with the great difference that pruning is done after flowering instead of before. The small shoots of a plum-tree grown for its fruit are cut back to spurs, partly because it is necessary to limit the number of fruits borne so as to secure size and quality, and partly because, if shoots were allowed to extend, the tree would assume an unwieldy shape. We cut back the shoot before flowering because we wish to limit the number of flowers that expand. But with flowering-plums, flowers, not fruit, are what is desired. However, we still want a shapely tree, so we allow the flowers to expand and fade, and then the time for pruning has arrived. The small shoots are cut back to about 2 in. The back buds break quickly, and new shoots are made. These will flower the next season. They would not flower if cut back too late, and if cut back during winter, as is so often done, the flowers are mostly cut away. Always remember that with such trees—and the same is true with most flowering-shrubs—it is sprays that are wanted and that alone look beautiful. Two-thirds of a spray cut away leaves but a sorry object of a stump. The shape of the tree is of no less importance. Main branches should be led up in a manner similar to the way they are trained in fruit-bearing trees—evenly disposed and not crowded, but not with a hollow centre. The principle here outlined is applicable to all classes of flowering-shrubs. Pruning should be done immediately after flowering, and the resultant growth may be expected to attain sufficient maturity to flower properly when its time arrives, and this time of pruning may be any part of the year.

Gladioli.—These are of many varieties and different habits, but those now referred to are the large autumn-flowering varieties. It is always considered wise—even necessary—to lift them each year; not because of any fear of them rotting in the ground, but because a drying-off of the bulbs is thought to be essential to the production of good flowers, and to prevent their throwing back to the original type. One may see in many gardens clumps of a sort of brick-red gladioli. They are very common indeed, yet very few planted them as such; they are good varieties that have thrown back. It is now time that lifted corms were planted back. My advice to any one who has had the unfortunate experience of their varieties degenerating is to make another attempt. Corms may yet be purchased, and few flowers are more easily cultivated or more beautiful. I am not aware that there is any secret in their cultivation and management beyond the lifting referred to. Plant them in deeply worked soil, well drained, and with manure put deep down, so as not to be in contact with the corms. Plant 6 in. deep.

Plant *dahlias*, *delphiniums*, and all herbaceous plants at once. In favourable places seeds of hardy flowers, including the favourite mignonette, may be sown in the open. Half-hardy annuals should be raised under glass, or, if they are to be sown in the open, defer sowing till the beginning of November. *Antirrhinums* are becoming an important class. There are both dwarf and tall kinds, and in both there are many differently named varieties. Those plants which were raised in autumn will flower in early summer. Seed sown at this time will provide plants that will flower in autumn. If *Canterbury bells* were not sown in autumn, no time should be lost in getting seed in; the sooner the seedlings are up, the better plants there will be for next season. *Lobelia* for edging may be increased by division or by seed. In either case it is best done under glass. Very small pieces will make good clumps before long. *Alyssum minimum* makes a good edging where white is the colour required, and is useful for dividing colours in ribbon beds or borders. It may be sown where it is to grow.

The lucerne-growth at Ruakura Farm of Instruction is phenomenal for the time of year.

Winged thistle is rapidly spreading throughout the higher lands, and is proving of immense value in such country as Central Otago, where large areas were practically denuded of all vegetation until the advent of this most useful fodder plant.—*A. H. Blundell (Otago)*.

THE POULTRY INDUSTRY.

F. C. BROWN.

If all the stock required has not been hatched, no time should now be lost. There are only a few weeks more in which stock can be produced which will meet with those favourable conditions necessary to their best development. The objective should be to rear the birds at a time when the main development will be taking place as the days lengthen, rather than having them developing with waning days. Again, to make satisfactory growth it is necessary that the chickens should be well grown before they are called upon to withstand the trying heat of the summer. In other words, the birds should be hatched during weather which will enable them to make the best development. Then, chickens hatched in the height of summer, even providing that they have every protection from the midsummer heat, are too soon subjected to the cold weather often experienced in early autumn. Therefore, let there be no delay if more chickens are to be hatched.

While it is too late now to hatch ducks for the Christmas-table trade, October is a good month to hatch ducks of a laying type. They may then be expected to lay about April next. Generally speaking, ducks may be hatched much later than chickens, owing to the rapid way in which they develop.

Those who have to depend on the natural means of incubation, and have in consequence been handicapped in rearing the number of chickens they desire, may counteract the drawbacks of late hatching (now that brooders are more plentiful) by judicious management. The chickens should be encouraged in every way to develop without check. They should be well protected from vermin. The coop should be repeatedly shifted to fresh ground; good shade from wind and summer heat should be arranged; a constant supply of fresh charcoal, grit, water, and green stuff should be kept before the young ones; and the food should be of the best description. If any one requirement should be emphasized more than another, it is that of cleanliness.

THE CHICKEN-COOP.

One of the most common mistakes I have noticed in visiting poultrymen is the makeshift appliances which do duty for chicken-

coops. I do not mean to say by this that elaborate or expensive coops should be purchased. There are very few men on the land who cannot make a good enough coop. Where the mistake is made is in failing to construct the coop solidly enough, and in not making it sufficiently draught and rain proof. A box with a sack thrown over it and a couple of bricks placed on top to keep the sack in place may do well enough in ideal weather, but such a contrivance is only inviting trouble and disappointment at a season when wind and rain may naturally be expected. Again, how much money is lost by coops not proof against rats? The makeshift coop is generally a dear thing in the long-run. Not only should the coop be a proper protection for the hen and her chickens, but it should have a run attached which will effectively protect the young ones during the daytime from cats and vermin. There is surely no pleasure in the business when there is a constant fear of the unprotected chickens being carried off. In many cases I have seen more money lost by failure properly to protect chickens hatched from expensive sittings than would have paid for up-to-date coops many times over.

The Starvation Process.

The most common fallacy in the poultry world to-day, and the most dangerous one, is that it is possible to overfeed the laying type. I have repeatedly been called to advise poultrymen—sometimes at long distances—in regard to the failure of their stock to lay or their inability to withstand disease, and when I have reached the scene of the trouble it has only been to find that the starvation process has been at work, the birds probably not having received sufficient nutriment even to maintain them in proper health, much less to enable them to produce eggs. The day has gone for allowing hens to scratch for their living, and the scientist has yet failed to discover just how much a hen needs to nourish her body or to manufacture her almost daily product. It may have been all very well at one time to limit the allowance of food, seeing the then comparatively small production of eggs; but with the remarkable development that has taken place in egg-yielding power of such a breed as the white Leghorn the practice of restricting the food-supply is not only cruel but is decidedly unprofitable. In declaring emphatically that the laying bird cannot be overfed I do not mean to infer that the non-layer and the bird past her laying prime should be given all the food they will eat. These types of birds should not be in the flock. They are fat not because they have been overfed, but simply because the food the layers are converting into eggs they are convert-

ing into bodily condition and fat. A good object-lesson is frequently provided in the case of hens mothering chickens. These will come on to lay even before the chickens are ready to leave them and before any member of the general flock. The reason is not far to seek. They have been frequently and liberally fed because of the attention paid to the chickens with them, and thus, having digested something more than is required for bodily maintenance, their egg-forming functions are stimulated, and laying naturally ensues. Giving laying fowls all they will eat does not mean giving them a liberal ration at one meal and a spare ration at another; it means liberal and regular feeding. Again, the food supplied must be of the right quality—food capable, after the bodily wants of the bird have been supplied, of enabling eggs to be manufactured from it, for it is impossible to get something from nothing. And while the food-supply should be ample, the bird should be maintained in the best of health in order that she may be able to stand the great drain on her system which heavy egg-production entails.

EGG COMPETITIONS.

The great weakness in the egg trade to-day, especially where the eggs come from the farmer, is in the manner in which they are marketed. The careless way in which many eggs are despatched to the consumer, in a dirty state and of all sizes and conditions, is not only sufficient to prejudice the consuming public against eggs, but means a direct loss to the producer, who cannot expect anything but second- and third-grade prices for such unpresentable commodities. It is generally the case that the man who is careless about the appearance of his eggs is also indifferent as to their internal condition. Societies which endeavour, by competitions and demonstrations, to create the necessary interest in this important question are doing excellent work for the industry. At the recent show of the Christchurch Poultry Society there was staged the finest display of eggs I have yet seen. The class for export eggs was splendidly patronized, and the exhibits formed a great array of eggs as they should be sent to market. It was an object-lesson which should serve a most useful purpose, though unfortunately the display was not witnessed by those who require the lesson most—the farming community. Were such displays made at our agricultural and pastoral shows they would no doubt have the effect so much desired; whereas when a class is provided at an agricultural show it is generally for the dozen of largest eggs, which is about as sensible as giving a first prize to the largest cockerel, the largest sheep, or the largest bullock, quite irrespective

of quality. In the country-show class for a dozen eggs one only requires to save up the double-yolked eggs to secure the award. In such a competition as that at Christchurch not only was cleanliness, colour, bloom, and uniformity considered, but the colour of the yolk and the size of the air-cell (this being the indication of age) were taken into account. This is as it should be.

THINGS TO REMEMBER.

The Christmas duck should be hatched now.

Fancy feathering and heavy egg-laying seldom go hand-in-hand.

Wet weather in many cases is responsible for low fertility in the breeding-pen.

It is more profitable to rear a few chicks properly than many indifferently.

Loose-feathered birds stop laying when they experience cold snaps. Aim at close, thick feathering.

If you want eggs during the next dear season hatch your chicks now.

Keep chicks steadily growing from the shell. The least set-back is never caught up.

The flocks of the successful breeders not only receive the best grades of food, but as much of them as they can eat.

Boiling refuse vegetables to make a bulky food is poor economy, especially where the high-type layer is concerned.

The hatching-qualities of eggs are sometimes affected in transit; therefore don't always blame the breeder. It is not fair to judge results between eggs that have travelled and those that have not.

The novice should be guarded in accepting many of the short-cuts advocated in poultry-keeping. Factors in successful poultry-keeping are good stock, liberal feeding, and common-sense management.

If some flocks of birds were reduced to half their present numbers and the present food-supply continued, the profits would be greatly increased. The starving process is the weak link on many unsuccessful plants.

ARTIFICIAL BROODING.

C. J. C. CUSSEN.

THE greatest and most expensive problem that a large poultry-breeder has to face is the hatching and rearing of chickens each year to renew his flock. Consequently the percentage of birds raised from the eggs set means a great deal to the poultryman. The object of this article is to endeavour to place before readers a system that has proved a success at the Ruakura Farm of Instruction, together with a few points which, based on the experience and observations of the writer, are of importance if the best results are to be obtained.

In the first place, in order to rear strong, healthy, vigorous birds the eggs must come from strong, healthy, vigorous stock that have been properly fed and cared for. . The eggs must be given proper attention during the period of incubation. It is not sufficient merely to hatch chicks: they must be *well* hatched. This is of great importance, for, as a rule, the better the hatch the larger will be the percentage of chickens reared. It stands to reason that if a number of chicks are found dead in the shell the cause of death to these chicks must also rob the others of a certain amount of vitality. Poorly hatched chicks may be reared, but they need a great deal more attention, and they seldom make good breeders.

There are many makes and types of brooders, and most of them can be worked with success if given the necessary care and attention. Whatever class be used it should be built for warmth; the walls should be thick enough to keep out the cold and to retain the heat. A good brooder contains a hover, which takes the place of the hen, and under which the chick spends the greater part of the first two weeks of its life, and a nursery, which is the chicks' playground. The best brooders supply the chicks with plenty of room, warmth, and fresh air; but when there is a lack of any of these the strain on the vitality of the chicks will be great, and only the strongest will be raised. The one in use at Ruakura is of the large pipe sectional type, heated by means of an Ideal stove with automatic regulator attached. It is similar in style to the one shown on page 41 of the Department's poultry pamphlet and in use at the Burnham Poultry-station. As the plant at Ruakura was erected after that at Burnham a few im-

provements were effected in its construction. The glass doors, instead of being on top of the hovers, are at the back. This is a great improvement, as, without opening any doors, one can see at a glance whether the chicks are comfortable or not. In order to keep the light from under the hover, sack curtains are hung over these doors. The pipes are set as far back as they can be put. This enables the chicks to get away from the heat, if necessary. All sections are open in front. The hovers are placed just above the pipes, and can be moved to and fro, according to the weather and when the chicks require more or less heat and ventilation. For bedding under the hovers we use pine-needles, and find it a first-class bedding material for chicks, *if dry;* but care must be taken to see that whatever may be used is dry, for dampness underneath the hover is fatal and must at all costs be avoided. The pine-needles should be collected in the autumn, just after they have fallen from the trees, and stored away. By so doing they will be dry and in good order for use when required. It is not advisable to use sand, earth, bran, or sawdust to bed chicks down with in the early stages, as they are liable to eat too much of these during the first week. After about ten days sand may be used, but certainly not at first. I have seen practically a whole batch of birds die during the first ten days through eating sand that was used in the brooders.

A temperature that has given good results here is about 95° F. underneath the hover when the chicks are put in, and retained at that for the first week, when it may be reduced gradually each day according to the weather and how the chicks are doing. In taking the temperature of the brooder the bulb of the thermometer should not be on the ground, but about the same distance from the heat-supply as the backs of the chicks will be. Proper warmth is of great importance in artificial brooding; chilling or overheating may destroy a large number of chicks during the first two weeks. If overheated, chicks undoubtedly lose vitality, and cannot be expected to develop into the most profitable fowls. When they are chilled, loss of appetite, bowel trouble, and indigestion may in many cases be the result.

Again, overheating in the sun during the first two weeks, and in fact at all times, should be guarded against just as much as overheating from the lamp or stove. The best results have been obtained when not more than fifty chicks were brooded at a time in each section. We have often had to put in more, but still fifty is quite a sufficient number.

The chicks must be confined during the first few days, or at least until they know what to do and where to go when they require heat. The natural instinct in incubator-hatched chicks is

not as well developed as in those hatched under hens. They do not learn to select their food as soon, and appear stupid, not knowing where to go when they are cold. Not having this intuition, they must be taught, and need training. In the writer's opinion it is from want of this training and attention during the first few days that one hears of so many brooder chicks dying during the first two or three weeks. In some cases chicks will gain this knowledge during three or four days, while in other instances they do not acquire it under a week. It has also been noted that the chicks from a machine, where a number have died in the shell, are, as a rule, more stupid and take a deal more training, thus tending to emphasize my contention that the cause of death to these chickens in the shell has robbed the others of a great deal of their natural vigour.

The person working the brooder must use his judgment as to when this attention can be discontinued and the chicks left to look after themselves. All who have raised chicks in the natural way with hens must have noticed how after each meal all chicks are called by the hen to be warmed up, even if it be only for a few minutes. No doubt these few minutes mean a good deal to the welfare of the chicks, and it rests with the brooder attendant to see to this important point when rearing chicks artificially. It is not intended to infer that the chicks should be "coddled"—far from it, for, once they know where to go to get heat and return unaided, they should be given all the freedom they desire.

As to feeding, we have started chicks on many different feeds, such as (1) pinhead oatmeal, given dry, with a little fine broken egg-shell as grit; (2) fine cracked wheat, about the size of coarse oatmeal; (3) hard-boiled eggs and bread-crumbs; (4) oatmeal and fine cracked wheat; (5) rolled oats and bread-crumbs. Grit is given with each feed from the start in the form of finely broken egg-shell. After three for our days fine sea-shell grit is used, but I prefer the egg-shell to start with. Green feed is given from the second day. It should be young and tender and cut very fine.

Good results have been obtained from each of the foregoing when used as a ration for the first three or four days. After that, however, a change is considered advisable, as it is found that a variety ration has a more satisfactory effect. Boiled rice, mixed into a crumbly mass with oatmeal and sharps, is good for a change. Young chicks are very fond of rice fed in this way. When boiling rice we use three parts of water to one of rice. Cooked in this way it boils fairly dry. As soon as possible the chicks are taught to scratch for their feed. This is done by scattering a little finely cracked grain in the litter. For litter in the nursery and

brooder pens (inside the house), cavings (waste from the threshing-machine) is used, but it should be fairly fine and dry. A mixture that has been fed with good results is made up as follows: Hulled oats twelve parts, cracked wheat twelve parts, rolled oats four parts, cracked maize four parts, hemp-seed one part, canary-seed one part, dried blood one part.

The above mixture is fed dry in the litter, which should be 3 in. or 4 in. deep in order to give the necessary exercise in hunting for the grains. No feed is given until the chicks are at least thirty-six hours old. After that they are fed every three hours for the first four weeks. For the first two days we now use mostly a mixture of two parts pinhead oatmeal and one part fine cracked wheat, or pinhead oatmeal with a little fine grit mixed in. This is fed dry on shallow wooden trays, and is left with the chicks for about ten minutes at each feeding. After they learn to scratch, all grain feed is fed in the litter.

As a variety ration has given the best results, a mash is generally given two or three times a day. This is mixed almost dry and is fed on trays, which are left before the birds for not more than ten minutes. After each feed of mash the trays are cleaned off, and a fresh feed is given next time. When they learn to select their own feed, grit in which a little fine charcoal has been mixed is always placed before them.

As a green feed is a most important item of a chick's menu, it should be supplied in a liberal and regular quantity. It is a great mistake to give this important item one day and not the next, for given in this way it may cause trouble. Green lucerne is what we use most of, and it would be difficult to find anything that the chicks relish more and thrive better on. A little meat is given after the first week, but if too much be fed it will cause indigestion. Before removing the birds from the brooder they are gradually hardened off, and are not put out until they are fairly well feathered. Leghorns and Minorcas are generally well feathered at about seven weeks, but Orpingtons and Wyandottes take about two weeks longer. The time of removing them to the colony houses depends greatly on the weather and time of the year. If removed too soon they are checked, which must be avoided if the best results are to be obtained.

It is hardly necessary to add that cleanliness is most essential. Every morning all bedding underneath the hovers and the litter in the nursery and brooder pens are well shaken up. Also, when required, all is cleaned out and replaced with fresh material. Before placing a fresh batch of chicks into a brooder where others have already been it is advisable to disinfect it, and certainly to see that it is thoroughly clean.

THE FRUIT CROP.

THE officers of the Orchards, Gardens, and Apiaries Division report as follows on the conditions of the fruit crop at the end of August:—

WHANGAREI.—Lemons: Looking well. Loquats: Heavy crop. Oranges: Nearly finished. Pruning and spraying is completed. All stone-fruits (with the exception of English plums) are showing an abundance of blossom. Consequent upon the abnormally dry summer experienced, followed by a mild winter, there is every prospect of an early season. In most parts of the district last season's dry weather has considerably affected fruit-trees of all classes, especially peaches and nectarines. This is particularly noticeable where little or no cultivation has been indulged in.—*J. W. Collard.*

AUCKLAND NORTH.—Apples: Local supplies nearly over. Cherries: Promise good crop. Lemons: Looking well. Nectarines: Showing good promise. Peaches: In full bloom. Pears: Buds just breaking, promise good crop. Plums: Promise fair crop. Plums (Japanese): Looking well. Strawberries: Plants looking well. Pruning and spraying with red oil and Bordeaux practically over; every appearance very early fruit season.—*W. C. Thompson.*

AUCKLAND SOUTH.—Apples: Early varieties bursting into bloom, others very forward. Apricots: Very heavy blossoming. Lemons: Nice crop. Nectarines and peaches: Very heavy blossoming; good prospects; a few early varieties now set their fruit. Pears: Trees looking well; every indication of heavy blossoming. Plums: Heavy blossoming. Strawberries: Looking exceedingly well. Tomatoes: A few now being planted; a large area being planted this year in view of exhibition.—*N. R. Pierce.*

HAMILTON.—Winter pruning and spraying operations have practically ceased for the year. Late peaches and nectarines are showing a wealth of bloom, and should favourable weather ensue the crop should be very abundant this forthcoming season. Japanese plums are also well forward. Lemons are in fair supply on the markets. Gooseberries are bursting into leaf and bloom, and indications are for a fair average crop.—*T. E. Rodda.*

POVERTY BAY.—The earlier-budding varieties of peaches, apricots, and plums are already setting their fruit, this season being between three weeks and a month earlier than last. Some of the earlier apples and pears are also forward, and, judging by the appearance of the buds, should a favourable spring ensue, good crops may be anticipated. During the month a co-operative fruit-testing acre has been established at Heston, about five miles from Gisborne, on property owned by Mr. D. J. Barry, and tenanted by Mr. P. McColl, who I feel sure will do their utmost to ensure success.—*W. R. L. Williams.*

MANAWATU AND WAIRARAPA.—Apples: Pruning and spraying practically finished, and cultivation being attended to; trees well supplied with spurs for next season's crop. Cherries: Very healthy, with every sign of good crop. Nectarines, peaches, and some varieties of pears are in full bloom, showing great quantities of fruit-spurs; much thinning of fruit will be required if all fruits set. Plums: Indications of a heavy crop of both English and Japanese varieties.—*G. Stratford.*

WANGANUI.—All classes of fruit-trees are looking well, most of the stone-fruits being now in full blossom. The weather is all that can be desired.—*W. C. Hyde.*

HASTINGS.—All varieties are looking well for next season's crop, excepting peaches and nectarines. These, as previously reported, suffered rather badly through various causes last summer, also the recent bad weather has interfered considerably with the late winter spraying of these classes of fruit.—*J. A. Campbell.*

WELLINGTON.—Apples and pears are showing a good supply of fruit-spurs, and should the mild season continue there will be a good crop. Peaches, nectarines, and plums are showing a fair amount of blossom. Tomatoes, inside and outside, are being planted extensively. Winter spraying is almost over.—*T. C. Webb.*

Nelson.—Apples: Not yet forward enough to express an opinion on prospects. Apricots: Excellent show of bloom. Cherries: Also looking well. Nectarines and Peaches: Now in full bloom, and looking well. Pears: Well forward, and showing a heavy supply of fruit-buds. Plums (English and Japanese): Both carrying heavy bloom. Strawberries: Good quantity being planted again this season. Heavy rains about the middle of the month, followed by good weather, has brought all fruit-trees well forward—probably too early, as, from the quantity of snow still on the adjacent mountains, a cold snap may be expected later, endangering the setting of fruit. Stone-fruits and pears are showing exceptionally heavy. Some growers are still using oil sprays on apple-trees. Lime-sulphur is also being used extensively as a winter wash this season for red spider, and also as a fungicide. Planting is not yet completed. Apple shipments are now falling off considerably; good prices are being obtained.—*J. H. Thorp.*

Blenheim.—Apples: Small supplies are still coming into the market. The weather has been exceptionally dry this winter, and consequently there is every probability of an early spring. All fruit-buds are very forward. Most of the peaches, apricots, and plums are out in full bloom, and a few early varieties of apples and pears are breaking into bloom. Unless we get some severe frosts later (which is more than likely) there is every prospect of a good crop throughout the district, although the birds are doing a considerable amount of damage by picking out the fruit-buds, more especially plums and peaches.—*B. G. Goodwin.*

North Canterbury and West Coast.—Apples: A fair quantity still coming forward; those in local cool stores keeping well. Pears: A few still coming forward, chiefly from the cool stores. Pruning and oil-spraying now nearly finished. Bordeaux spraying now commencing. All varieties of trees showing well for the coming season.—*W. J. Courtier.*

Christchurch and Suburbs.—A cold month has been experienced; the promise of an early spring is not likely to be fulfilled. The wet weather has hampered orchard work. Black aphis has made an early appearance on peaches. —*Gordon Esam.*

Timaru.—In most cases pruning is finished, and growers are busy applying Bordeaux mixture for the control of fungus diseases. It is pleasing to note that growers are beginning to recognize the value of thorough spraying, and that it is a cheap and efficient insurance policy. Frosty spells are still being experienced. —*A. B. Mansfield.*

Dunedin.—The weather during the month of August has been very wet. Early varieties of plums, peaches, and apricots are breaking into blossom.—*W. T. Goodwin.*

MARKET CONDITION OF LOCAL FRUIT AND VEGETABLES.

The Fruit Inspectors of the Orchards, Gardens, and Apiaries Division report as follows on the condition of locally grown fruit and vegetables in the shops and auction-rooms, and the market position of these, for the month of August:—

Auckland.—The supplies of locally grown fruit are now almost exhausted in the north, and only small consignments are being handled. The demand is very good, and there is little trouble in disposing of fruit at good prices. Choice dessert apples are realizing from 10s. to 13s. per case; choice cooking, 8s. 6d. to 12s. 6d., according to quality. Poor-man oranges are in brisk demand at 7s. to 8s. per case. Lemons realize 10s. to 12s. per case. Tree-tomatoes, 6s. to 6s. 6d. per 18 lb. box. Hothouse tomatoes have risen from 9d. in the earlier part of the month to 1s. 1d.—*C. Craigie.*

Wellington.—Apples and pears are bringing good prices. Vegetables are in fair supply, which is considered rather unusual at this time of the year. Owing to the early spring, flowers are very plentiful and prices are low. It will be noticed

that Tasmanian apples are realizing higher prices than local apples, although the fruit is of the same quality. The higher prices are due to good grading and packing. The prices during the month are as follows: Tasmanian dessert apples, 10s. to 12s. per case; cookers, 5s. to 6s. 6d. per half-case; local dessert apples, 7s. 6d. to 9s. per case; cookers, 5s. 6d. to 8s. 6d. per case. Pears, dessert cool-stored, 6s. 6d. to 8s. per half-case. Vegetables: Cauliflowers (in fair supply), 5s. per sack; others, 2s. to 4s. Cabbages, 4s. to 7s. per sack; others, 2s. to 5s. Potatoes are down in price—£3 10s. per ton. Onions have eased slightly—£9 to £9 10s. per ton. All other vegetables are in good demand and prices are fair.—*T. C. Webb, jun.*

CHRISTCHURCH.—Apples, supply shortening; no cool store offering. Good well-graded dessert or cookers, 8s. to 9s. Pears, none offering. Poor-man oranges, 8s. 6d. to 10s. Potatoes: new, 3d. per lb.; old, 27s. 6d. a ton in paddock. Local onions not in very good order—6s. to 7s. per cwt.—*G. Esam.*

DUNEDIN.—A few lines of apples are still coming to hand. The supply of pears is about finished. A small supply of Auckland Poor-man oranges came forward in splendid condition. Potatoes, plentiful. Turnips, carrots, swedes, cabbages, rhubarb, and cauliflowers, in short supply. The prices ruling for the month are as follow: Apples: cookers, 6s. 6d. to 7s. 6d. per case; eating, 7s. 6d. to 8s. 6d. per case. Pears, 2½d. to 2¾d. per lb. Poor-man oranges, up to 10s. per case. Hobart eating-apples, 10s. to 10s. 9d. per case; cookers, 7s. 6d. to 8s. 6d. per case. Potatoes, £2 10s. to £3 per ton. Swedes, 20s. to 30s. per ton. Cabbages, 2s. per sack. Carrots, 4s. 6d. per sack. Rhubarb, 3d. per lb. Cauliflowers, 4s. to 5s. per sack. Shops well stocked.—*E. T. Taylor.*

INVERCARGILL.—New-Zealand-grown fruits on the Invercargill market during August have been—Auckland Poor-man oranges, Nelson apples, Canterbury apples and pears, Teviot apples, Southland apples. All lines forwarded were clean and free from disease, and the quality of the majority was good. Vegetables are plentiful and of good quality. Potato-market glutted, and only 178 sacks shipped to Sydney. Merchants are not anxious to buy at present nominal price—30s. o.t.c.s. Those shipped to Sydney this month were very good lines, comprising Up-to-dates, Scotias, and Skerry Blues. The current prices were—Dessert apples, 8s. 6d. to 10s.; cooking, 6s. 6d. to 8s. 6d. Pears, 5s. 6d. to 8s. 6d. Poor-man oranges, 9s. to 10s. Potatoes: Prime, £3; medium, £2; potatoes, o.t.c.s., 50s. beginning of month, 30s. at close: Up-to-Date seed, £3 to £4. Onions (Canterbury), 10s. per cwt. Cabbages, 3s. 6d. per sack. Cauliflowers, 5s. a sack. Swedes, 1s. to 1s. 6d. per sack. Carrots, 4s. per cwt. Parsnips, 4s. 6d. per cwt.—*R. Hutton.*

HONEY-CROP PROSPECTS.

THE Director of Orchards, Gardens, and Apiaries Division has received the following reports on the honey-crop prospects from the Apiary Inspectors:—

AUCKLAND.—In the Auckland districts we are having a very early spring. Willows are now yielding nectar, and the white clover is beginning to blossom, but it is too early yet to attempt to predict what the new season's crop of honey will be. Waikato beekeepers have now received the returns of the recent shipment of honey, and the average price obtained was £42 per ton, some of it bringing as high as £45.—*G. V. Westbrooke.*

WELLINGTON.—The present spring is an early one. Willows and tagasaste are yielding a certain amount of nectar. Honey at present on hand is selling at firm prices. Beeswax is realizing 1s. 4d. per pound.—*F. A. Jacobsen.*

DUNEDIN.—Bulk honey is in steady demand, with an upward tendency. The market is bare, very little offering. Good lines of sections forward, but, owing to careless packing, prices are against producers. It will pay beekeepers to give more attention to shipments. Pat honey is meeting with strong inquiry. Choice bottle honey, 8s. per dozen. Beeswax is scarce at 1s. 4d. per pound.—*E. A. Earp.*

THE WEATHER FOR AUGUST.

D. C. BATES.

THE month of August was notable for three extensive cyclonic systems, two whose centres passed over the South Island—viz., on the 12th and 24th respectively. The third passed in the north on the night of the 15th. About these three dates extensive rains were experienced, the heaviest occurring in the south-eastern portion of the South Island, where the total exceeded the average considerably. There was, however, a predominance of fair and mild weather during the month, except towards the close, when very cold southerly winds prevailed.

DISTRICT NOTES.

Chiefly from Telegraphic Reports.

District.

1, 2, 3. Exceedingly unsettled, wet, and at times stormy weather was experienced, with the result that the total rainfall was about 30 per cent. above the average. The heaviest rains fell on the 11th, 15th, and 22nd, Auckland City recording over 1 in. on all three of these days.

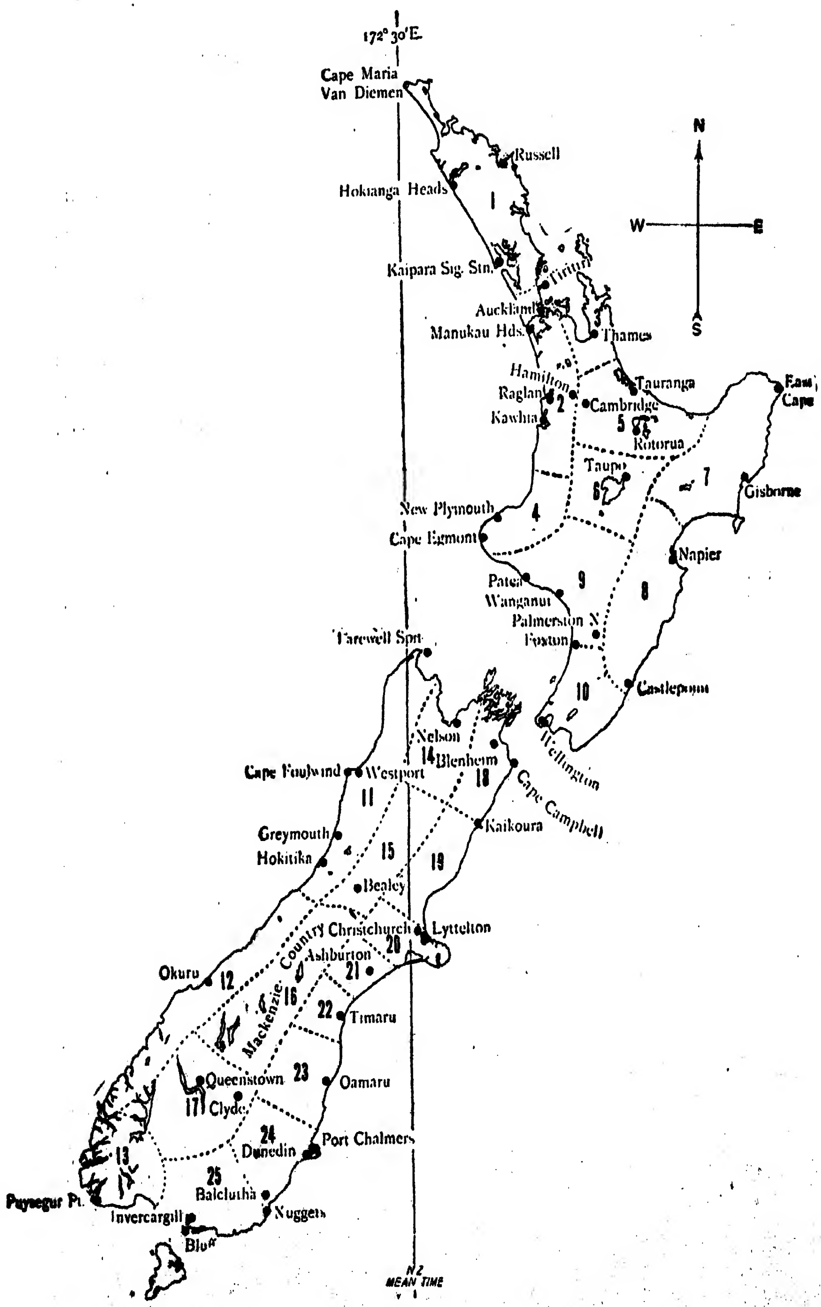
4. A considerable amount of cold showery weather prevailed, with south-easterly winds. North-easterly gales were experienced on the 11th, 12th, and 13th, and some heavy rain fell about this time. However, there were several periods of fair weather. The aggregate month's rainfall was usually about 20 per cent. less than the average.

5, 6. The rainfall was 25 per cent. over the mean for August, the major portion falling during the first half of the month. Waiotapu returned over an inch of rain on three successive days—viz., the 11th, 12th, and 13th—and other stations in these districts also recorded heavy rain during this period. Fair weather prevailed generally between the 16th and 21st. Severe frosts occurred on the 29th and 30th, and the last week was subject to extremely low temperatures.

7, 8. These two districts, which during the previous few months had been subject to a low rainfall, in August experienced much showery weather, especially in the latter half of the month. Heavy rain fell in parts on the 11th, 12th, and 16th, resulting in a total fall for the month of about 7 per cent. in excess of the average in district No. 8; but in district No. 7 the departure from normal varied slightly both in a positive and negative direction. Mild spring conditions set in earlier than usual.

9. Fair weather predominated during the month, and the rainfall was lower than the average by about 30 per cent.

10. With the exception of the last week and between the 11th and 16th, when cold and wet conditions ruled, the weather was generally fair and mild. The returns give a total rainfall slightly below the average for the month. Wainuiomata, however, had an excess of 35 per cent., this owing to the heavy fall of 3·11 in. on the 25th.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District.

11, 12. The northernmost portion of district No. 11 recorded 15 per cent. more than the average rainfall, but elsewhere there was a slight deficiency, ranging from 2 per cent. in the north to 40 per cent. in the south. Most of the precipitation was recorded during the first half of the month. The latter half, with the exception of one or two days, was characterized by fine weather, bright days and frosty nights.

13. Fair weather was the feature of the month, and the rainfall was slightly less than the mean.

14. Very heavy rains occurred on the 11th, 12th, 13th, and 23rd, over 2 in. being measured at some stations on the 11th and 13th. As a result the average rainfall was exceeded by about 75 per cent. On the remaining days fair to fine weather was experienced.

15. Precipitation was everywhere considerably below the average, generally by about 70 per cent. There were three periods of wet weather—viz., between the 1st and 4th, the 10th and 13th, and the 22nd and 24th. For the rest of the month weather was fair, although at times dull and foggy.

16. The month was almost free from strong winds, and, with the exception of a few wet days in the middle and towards the end, fair to cloudy weather predominated. Rainfall was slightly lower than the average.

17. Owing to some heavy rain about the 13th, the total fall was somewhat in excess of the average. Some very cold weather was experienced towards the close of the month, but usually conditions were very favourable.

18, 19. Rainfall was slightly less than the normal. The latter portion of the month was cold, and some hard frosts occurred on several days. Most of the rain fell between the 9th and 13th, and on the 25th. A south-east gale was experienced on the latter date. However, some very fine weather prevailed during the month.

20, 21, 22. There were several days with heavy rain, particularly the 15th, 24th, and 25th, causing an aggregate total fall of about 50 per cent. above the average. Cold southerly winds prevailed during the last week, but otherwise the weather was fair.

23, 24, 25. Some stations, especially in district No. 24, report this as having been the wettest month for many years past. Three times the average rainfall was recorded in parts, chiefly owing to an abnormal fall on the 14th. Dull weather predominated.

THE ANNUAL FRUITGROWERS' CONFERENCE.

AT the recent conference of the fruitgrowers of the Dominion held in Wellington several matters of importance to the industry were discussed. Among the more essential decisions arrived at was a recommendation to adopt the new standard fruit-case designed by the orchard instructors of the Department. Several amendments to the Orchard and Garden Diseases Act suggested by the Department were also approved, as were the proposed export regulations, after some slight amendments which were not opposed by the Department. The conference was very insistent in its demand for the removal of the handicap at present placed on the industry by the duty on fruit-wrapping paper. It was pointed out that this paper has never been manufactured in the Dominion, and while the last attempt by the New Zealand mills to produce a satisfactory quality was still unsuited to the purpose, it was dearer than the imported article, even with duty added. It was also demanded that in consequence of the serious damage to orchards by the depredations of red deer protection of these animals be entirely removed. A pleasing feature of the conference was the determination of growers to tax themselves in order to provide means of developing the industry—this by the imposition of a levy of 6d. per acre per annum on all orchards over four years of age; the Government to collect the tax and to hand the amount, less cost of collection, to the Federal Council to be used for the opening-up of new markets.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtained from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith.

SILVER-BEET

MR. F. WHITEHEAD, Awamutu, Waikato :

Can you tell me if silver-beet has been tried as a feed for store pigs; and whether the yield of beet cut for the purpose of feeding pigs from a given area would be as great as that which has been grazed by sheep or cattle ?

The Fields and Experimental Farms Division :—

If cut for pigs silver-beet should give a greater yield than it would in the process of being grazed off by cattle or sheep, for the reason that the young shoots would not be injured and would therefore come more quickly away, and there would be less damage to the roots from cutting the crop than feeding off.

BUSH COUNTRY.

C. E., Tuatapere, Southland :—

I am felling and burning this year 25 acres of bush country. The soil is described as very fair, peaty, with a gravel bottom. Could you inform me how much seed should be sown per acre, and the most useful varieties ? The ground will be used for dairying in a year or two.

The Fields and Experimental Farms Division :—

Seed is sown in quantities from 25 lb. to 40 lb. per acre. The following has been found a most useful mixture for sowing after a burn. The quantities can be reduced if considered too large : Rye, 3 lb. ; cocksfoot, 7 lb. ; *Danthonia pilosa*, 3 lb. ; crested dogstail, 3 lb. ; timothy, 3 lb. ; *Poa pratensis*, 1 lb. ; meadow foxtail, 3 lb. ; brown-top, 2 lb. ; white clover, 3 lb. ; alsyke, 2 lb. ; *Lotus major*, 1 lb. ; tall oat-grass, 3 lb. ; meadow fescue, 5 lb. ; Chewing's fescue, 1 lb.

MOSS-INFESTED PASTURE.

"MOSSY," Howick Post-office, Auckland :—

The pastures here contain a good deal of moss. Could you give the reason, and the remedy for same ? The land is of clayey formation.

MR. GEORGE T. HARTWELL, Port Albert, Auckland :—

Please furnish description of remedy for moss-infested pasture. The pasture was surface-sown ; surrounds the homestead ; and was cleared of tea-tree (manuka) many years ago. It will be extremely difficult to get it ploughed. There are a goodly number of patches of moss ; otherwise it is good sward. Is lime or salt useful, or are both useful ?

The Fields and Experimental Farms Division :—

The description of the pasture and land points to want of drainage. This should be remedied, and basic slag should be applied at the rate of 4 cwt. to 5 cwt. per acre as a top-dressing. This treatment has given good results in the North Island. It is somewhat late in the season to apply the slag, and, if it is intended to do so, it should be applied at once.

Weed-killer.

Mr. Charles Pritchard, Parakai, Helensville, Auckland :—

Could you give me a prescription for a weed-killer that would eradicate tall fescue? I have a lot on the sides of drains and stop-bank where I cannot get at it with the plough. Do you know of a prescription that I could make up for spraying it with? And will you also tell me if I must keep the cattle off the pasture after using the spray? If so, for how long? There are several weed-killers in the market, but they are too expensive to use in large quantities.

The Fields and Experimental Farms Division :—

It must be remembered that a weed-destroyer that is fatal to a grass such as tall fescue will exercise the same effect on practically all other plants that may be in association with it. Arsenic and soda boiled together form the basis of the greater number of the proprietary preparations sold as weed-eradicators. It is, of course, poisonous, and decidedly dangerous to stock. The proportions are—Water 1 gallon, soda 2 lb., white arsenic 1 lb. Boil for twenty minutes, and dilute with 24 gallons of water.

Cherry-trees.

Mr. C. R. Newington, Evans Street, Timaru :—

Can you give me the names of two or three of the best variety of cherries to grow in the district?

The Orchards, Gardens, and Apiaries Division :—

Bedford Prolific, May Duke, Florence, and Early Purple Guigne are all good varieties of cherries that should do well in your district.

The Bot-fly.

"Cheval," Castledowns, Dipton :—

A horse of mine has just died from bots. We treated him for gripes, then inflammation, and finally rupture of the bladder, for when he tried to make water only a few drops of blood issued. After death I opened him and found several large clusters of bots hanging on to the inside of the paunch. Is there any remedy that can be given to horses occasionally which will kill these pests after getting into the stomach, and without injuring the horse?

The Live-stock and Meat Division :—

There is no remedy that we know of that will cause the destruction of bots without injury to the horse. Because you found bots in the stomach of your horse that died is no proof that they were the cause of death. If you had looked further than the stomach you would have probably found the true cause. Bots are found in practically every horse in the country, and when the animals are kept in good condition they do little harm.

Sowing Grass-seed.

"Subscriber," Hastings :—

It is intended to surface-sow with grass-seed (principally Chewing's fescue, clovers, cocksfoot, and crested dogstail) a block of mountainous country of a pumicy and burnt-slate nature of soil, which block has an altitude of 2,000 ft.

and lies thirty-five miles inland from the sea in a straight line. The country before being burnt (in the late autumn of this year) was covered with fern and tutu, and is now destitute of any growing herbage. The present intention is to sow the seed in the middle of August. Taking an average of seasons, there is little or no sign of spring in this locality until the middle of October. What effect will frequent rains, occasional falls of snow, and numerous hard frosts have on the germinating-powers of such seeds? If the seed were to germinate between the middle of August and middle of October, what effect would hard and repeated frosts have upon the tender shoots of the grass-seed?

The Fields and Experimental Farms Division :—

Surface-sowing grass-seed during periods when frosts are experienced every night is by no means a good policy, as very little germination will take place until the nights are comparatively warm. The seed being exposed and subjected to heat each day will tend to germinate, and then the tendency to grow will be checked by the cold nights, so that finally the seed is liable to be killed. If the seed were covered with soil, of course, germination would be delayed until the ground became fairly warm. In general, it would be far preferable to sow as soon after burning as possible, as then after rain the seed is likely to become covered with the consolidated ashes; but when the sowing is delayed till the early spring there is not much chance of the seed being covered, the ground having hardened on the surface. Of course, where sowing is delayed it is necessary to sow as early in the spring as possible, as otherwise the fern and tutu will come away at the same time as the seed and cover the young plants before they become established. Such being the case, it will be advisable to sow before the end of August and trust to the weather-conditions not being unfavourable.

KILLING WEEDS IN GARDEN-WALKS.

W. B., North-east Harbour :—

Please inform me as to the best means of killing weeds in garden-walks amongst the stones, as hoeing is a very unsatisfactory method.

The Orchards, Gardens, and Apiaries Division :—

The following preparation is very effective for killing weeds in garden-paths: Dissolve 1 lb. of powdered arsenic in 3 gallons of cold water; boil and keep stirring; then add 7 gallons of cold water and 2 lb. of crushed washing-soda; stir the whole well while boiling, and with a rose watering-pot apply to the paths in dry weather. This will be sufficient for spraying 25 square yards. An inclined board should be placed at the sides of the walks to keep the liquid off the grass or other "live" edging, otherwise it will be killed.

BACTERIOLOGY.

MR. J. D. CLARK, Church Street, Opotiki :—

Since coming to this district from Australia six months ago I have been struck by the huge loss occurring here through contagious abortion and mammitis, and similar diseases, and as I am interested in bacteriology I am thinking of importing a new microscope (1,400 dia.) and as a hobby take up the study of these diseases. I should be pleased to receive advice from you as to the best works, or text-books, I can obtain referring to the microscopical study of these diseases, and of any means by which I may be able to assist your Department in the way of carrying out experiments in this district.

The Live-stock and Meat Division :—

We are reluctant to throw cold water upon ambitious projects, but we cannot conscientiously recommend you to pursue the study of bacteriology as a hobby. In the first place bacteriology has become one of the most difficult and abstruse subjects of modern science. It can only be properly carried on in a well-appointed laboratory by persons who have had a thorough preliminary scientific training, such as is provided in the present-day medical or veterinary curriculum. This must be followed by further special training under competent bacteriologists. Moreover, unless a very sound knowledge be acquired of the vast amount of

literature on the subject, much endeavour may be wasted in repeating experiments which have been previously conducted by other workers. There is no advantage in possessing a microscope of the magnification suggested. The microscope in modern bacteriological methods is only of secondary importance. While thanking our correspondent for his well-meant offer of assistance, we would point out that the Department already has the services of qualified and specially trained experts. Before going to any expense in the matter of equipment, we would strongly advise that a visit be paid to the Department's Laboratory at Wallaceville, in order to see the nature of the work which is being carried out there, and to gain some insight into the subject of bacteriology from a practical point of view.

Farm Implements.

"Mechanic," Pakuranga :—

Is there any implement or machine that will in one operation pulverize the soil ready for sowing the seed—in other words, do the work of the plough, disc harrows, and tine harrows in one operation? Would such a machine be any very great advantage; and why? Has the Department any funds available for experiments to improve cultivating-implements?

The Fields and Experimental Farms Division :—

Complete cultivation at one operation necessitates the employment of very considerable horse-power, either in the form of teams of horses or in the form of agricultural tractors. The cost of this power would be beyond the means of the individual farmer. It would be better effected by a farm contractor, who would supply the plant and take contracts on a number of properties. This is the process in some other countries. The Department has certain information on this subject provided by implement-makers which can be forwarded to the inquirer should he care to peruse it. The Department has no funds allocated for experiments to improve cultivating-implements.

Blight on Cape Gooseberries.

Mr. R. Matthews, Fitzroy, New Plymouth :—

Eighteen months ago I planted out a small allotment with Cape gooseberries. Before bearing, however, they became badly blighted, and have remained so ever since. The pest under the microscope somewhat resembles a red spider. It moves fairly rapidly, and exists in great numbers on the under-side of the leaves, and also on the stems, &c. The plants appear very stunted and poorly, the fruit dropping off before maturing. I should be very much obliged if you would supply me with information as to how to deal with this pest. I enclose sample of blighted leaf.

The Orchards, Gardens, and Apiaries Division :—

The Cape-gooseberry specimens are badly attacked by red spider. It is a difficult matter to find a spray that will satisfactorily control the insect on such plants as Cape gooseberries without injuring the leaves. The following summer spray made of whale-oil soap, &c., has given very satisfactory results on peach-trees infested with spider in the Hawke's Bay District: Boil together for about half an hour 5 lb. of whale-oil soap, 7 oz. of sulphur, and 5 oz. of caustic soda in 3 gallons of water. Make up to 40 gallons. If possible, select a dull day for spraying, or spray in the evening. To make whale-oil soap, warm 14 lb. of whale-oil; in another vessel dissolve 2 lb. of caustic soda; let this cool until just warm, and then slowly add the warm oil, stirring well. When cold, this will set into a hard soap.

Ensilage from Lucerne.

"Kaha," Otaki :—

Regarding Mr. W. Dibble's article on silage ("The Stack System") in the June number: Suppose ensilage is to be made from lucerne and the farmer wishes to have only the one stack. To put his three or four cuttings of lucerne on this stack, would it be necessary to weight the stack fully between each cutting?

About what weight is necessary—*i.e.*, how many pounds to the cubic foot of green ensilage? Does the air have to be kept from the top of the stack, or would bricks do instead of earth?

The Fields and Experimental Farms Division:—

To put on three or four cuttings of lucerne at intervals of, say, six weeks or less after the stack is completed is not to be recommended. The weight being taken off, the necessary heat required to make first-class silage escapes, and in consequence the aroma disappears, and the mass below becomes deteriorated. Therefore when the quantity available is put together and weighted in the usual way it should not be interfered with until ready for use. It does not signify what dimensions the stack may be, as it is advisable to weight with earth to a depth from 20 in. to 24 in. over the whole surface to prevent the heat from escaping and at the same time to supply sufficient pressure to exclude the air from the sides. The average weight per cubic foot of lucerne ensilage is estimated from 40 lb. to 45 lb., according to the state of the material so used. The heat has to be prevented from escaping through the top of the stack, and that is why earth is preferable to brick or stones.

SOIL-INOCULATION.—PURCHASE OF HIVES OF BEES.

MR. C. ANDERSON, Utopia, Ellesmere, Canterbury:—

1. What is inoculated soil?
2. What is it inoculated with?
3. Why is it inoculated?
4. Where could a few hives of bees be obtained?

The Fields and Experimental Farms Division:—

1. This may possibly be explained by an example, as applied to lucerne. This plant, in common with other legumes, utilizes the nitrogen of the atmosphere. It applies this element to its own advantage. This assures the vigour of the plant, and, later, the enrichment of the soil. The presence of this element is accepted as demonstrated by the presence of nodules on the roots of the plants. Soils in which there are legumes (as clovers, lucerne, &c.) exhibiting root-nodules may be said to be inoculated soils.

2. Soil is inoculated by taking earth from a field in which such nodule-bearing plants are growing and spreading this on the soil it is desired to inoculate. There are also offered for sale preparations (as "Nitragin") said to contain cultures of the appropriate micro-organisms to assure the development of the nodules. This is added to a comparatively small quantity of soil, or to the seed. In practice this method of inoculation has failed to provide entire satisfaction.

3. Soil is inoculated because it is found by experience that the appropriate micro-organism may be absent from a particular soil when a legume that has not been heretofore present is sown. The difference between success and failure of lucerne has been demonstrated by comparing experimental plots, and even whole fields, where the micro-organisms have been introduced by inoculated soil with others untreated. Method: The organisms are transferred to the required situation by spreading on it soil from a well-established and thriving lucerne-field. The amount of earth used is from 250 lb. to 500 lb. per acre. This should be spread and harrowed with as little delay as possible.

The Orchards, Gardens, and Apiaries Division:—

4. As the Government do not now supply hives of bees, it would be advisable to buy bees from any reliable neighbours keeping them. Mr. Paratt, of Tai Tapu, Canterbury, is the nearest large beekeeper, but probably some could be obtained much closer to Ellesmere than this. Mr. Greaves, of Irwell, is another beekeeper in the district.

COW-FEED FOR COMING AUTUMN.

MR. R. L. MUIR, Auroa:—

I have a paddock of 15 acres that I want to put into cow-feed for the coming autumn. It was new ground broken up last spring, and put into swede turnips, which were fed off by cows. For the manure I put on 2 cwt. of manure to the

acre. What would you advise me to grow? If possible I want something I can turn the cows on to. I milk sixty. It is only a lease, which runs out next June; and I have to sow the paddock down before leaving. I thought of Buda kale. Does this crop taint the milk? Please advise what would be best; also what manure to use.

The Fields and Experimental Farms Division:—

You omit to give particulars of climatic conditions, nature of soil—good, medium, or otherwise. Should climatic conditions and soil be favourable for growing of maize I would recommend sowing 5 acres with maize and the balance with a mixture of oats, tares, and Italian rye. One-half of the area of maize should be sown about the 1st November, the balance in December. If sown broadcast, 2 bushels per acre; but if in drills, ¾ bushel per acre. Of oats 2 bushels, tares 1½ bushels, Italian rye ½ bushel per acre, sown in October. This mixture would give a large amount of valuable feed from January up to June. A temporary dividing-fence should be erected so that one-half would be fed off at a time. This would give a continuous feeding without any expenses of carting. Maize, of course, would have to be cut and carted, but it would pay well for the extra labour by giving feed from January to end of April, provided frost did not cut it down. 2 cwt. to 4 cwt. superphosphate per acre should be used.

Spraying.

M. D. G. J., Leamington, Waikato:—

Which is the best spray, and which strength, to spray a two-year-old orchard (peaches, nectarines included) without scorching the leaves, to keep off the brown beetle?

The Orchards, Gardens, and Apiaries Division:—

The brown beetle generally makes its appearance about November. When apple or pear trees are attacked, spraying with arsenate of lead to which a small quantity of resin solution has been added should keep the pest under control. Resin solution is made as follows: Proportions:—1½ lb. resin, 1 lb. washing-soda, 2 gallons water. Boil the water, dissolve the soda, add resin, and continue boiling until the resin has thoroughly dissolved. Add about 3 quarts to each 50 gallons of arsenate-of-lead spray. It is not advisable to apply this spray to peaches or nectarine trees owing to the risk of burning the foliage. Tarred sacking should be placed under these trees, and the trees should be shaken. This will cause a great number of the insects to fall and become caught in the tar.

Treatment of Soil.—Lucerne.

"Subscriber," Ealing:—

As a rule, the land in this district when ploughed and sown with oats in the autumn after harvest leaves a good clean stubble fallow. The next crop to be taken off this stubble fallow is turnips. When the stubble is ploughed in the late autumn, or winter, I notice in the spring that sorrel comes away quickly, and when the time comes to work the ground up for turnips the sorrel has possession. Would cultivating and harrowing at intervals during the spring keep the sorrel in check until the turnips are sown in December—better than leaving the ground just as it is after ploughing, and then cultivate and harrow it just before the turnips are sown?

Would you please advise me as to sowing and manuring, and the best variety of lucerne to grow in this part of the country. The soil has a depth of about 9 in.; there is no clay in the subsoil, which is of a shingly nature.

This country in a dry season suffers badly, as the soil is so free and subsoil so shingly. The soil will not hold moisture for any length of time.

The Fields and Experimental Farms Division:—

Sorrel is a weed that thrives in both alkaline and acid soils. It is inferred from the description given of the soil that it is not in need of drainage, having a free subsoil with shingle underneath. It may, however, be acid. A dressing of

lime, about 1 ton to the acre, would no doubt be beneficial. Liming will not get rid of the sorrel, but it will destroy the acid and poisons that make the soil unfriendly to most forms of plant-life, particularly the plants known as legumes, which embrace clovers, lucerne, vetches, peas, beans, and many others. Lime is also beneficial in loose sandy soils, making them more compact and more retentive of moisture. If it be desired to check or kill sorrel, this must never be allowed to seed. Eat it down with sheep before it can seed. When sheep are not available it must be cut with a mower before the seed forms, or ploughed down. After ploughing, cultivate and harrow frequently, but this tillage should not be given except in dry, hot weather. To cultivate whilst there is moisture in the soil only promotes the growth of the tiny rootlets.

Lucerne-growing: A deep, well-drained, non-acid, fertile soil, free from weeds, is most suited to this plant. A permeable subsoil is necessary, as the roots extend to great depths. Some time before sowing, lime should be applied at the rate of 1 ton per acre. The land should be brought to a fine tilth and well rolled before sowing. Sow on the flat with a drill in rows at least 14 in. apart, seeding about 15 lb. to the acre; 1¼ in. is deep enough for the seed to be placed. Lucerne is a poor fighter the first year, as its main strength during that time is used in developing the root. Hence it is often choked out by weeds which make more top than root. Intercultivation should therefore be given to keep down weeds until the plant is well established. On some lands it is necessary to inoculate the soil with nitrifying bacteria. This is done by the application of about 300 lb. per acre of soil obtained from an established lucerne-field. Most soils in Canterbury, however, do not require to be inoculated. As to the manurial treatment, it is held that it is not wise to use fertilizers on lucerne, particularly in Canterbury. A little nitrate of soda may serve to give the young plant a start, but it must be borne in mind that lucerne, owing to its deep-rooting habit, does not depend on the surface soil for sustenance for any length of time, for by the time the plant has formed three leaves the roots will have extended downwards quite 9 in. to 12 in. In many instances fertilizers applied to lucerne have had no effect, in others they have had an injurious effect, whilst in some cases they have only assisted in a greater growth of weeds, owing to these feeding on the surface soil, whereas the lucerne draws its plant-food from a deeper area.

Soil not holding moisture: The problem of improving such free soils resolves itself into so changing their mechanical condition that they become more retentive and will hold water and fertilizers better. This can best be done by adding decaying vegetable matter. Green-manuring furnishes a good means of doing this, and leguminous crops are preferable, such as clovers, vetches, peas, lupin, &c., which should be grown and ploughed under when the plants are in flower. Liming afterwards at the rate of 1 ton per acre will give beneficial effects.

IRRIGATING MARES.—FEEDING AN ENTIRE.

M. D. G. J., Leamington, Waikato:—

1. What is the best preparation for washing out a mare before giving her a service, and how long before the service? Also, how is the liquid administered?

2. Do you consider that it is necessary to give an entire a bran mash once or twice a week, if he is sufficiently supplied with young grass put in his box or rack every day after the day's travelling is done?

The Live-stock and Meat Division:—

1. If the mare be healthy there is no necessity to irrigate before service. This may be done should she return at the three weeks' end—a 1-per-cent. solution of pure bicarbonate of soda. Do not use baking-powder. The mare may be served in a couple of hours after irrigation. Should she return again, let the œstrum pass, and two or three days afterwards wash her out with the mercuric chloride solution as recommended in leaflet for abortion and sterility in cattle, using the half-tabloid strength.

2. When the horse is getting hard feed, which he should have if he is getting anything like a regular season, it is best to give bran. A couple of pounds a day may be given every day in his chaff and corn, giving him a bran mash on Saturday evenings.

CONTAGIOUS ABORTION.

"CAMPUS," Otaki Railway :—

1. For irrigating and disinfecting the parts of a bull, can you recommend irrigating a cow when in season, and then immediately turning her with the bull ?

2. Can you tell me how long the abortion germ takes to produce abortion in a cow : that is, should a cow within four or six weeks of calving become infected, how long would it be before she aborted ?

The Live-stock and Meat Division :—

1. No ; this method would not be satisfactory. Treat the bull in the manner recommended in the leaflet on abortion and sterility.

2. The period of incubation varies widely. Abortions have been caused experimentally by the introduction of cultures of the bacillus into the vagina in from one week to thirty-three weeks. In one experiment the period averaged 126 days. In another case where a clean herd of sixteen cows were served by a diseased bull five cows aborted within ten weeks, one in three months, and one four months and a half after service.

BROWN-TOP GRASS.

MR. D. SPENCER, Tolaga Bay :—

Is brown-top grass suitable for poor manuka country, height about 2,000 ft. above the sea-level ? What quantity should be sown per acre ?

The Director of Fields and Experimental Farms Division :—

Brown-top (*Agrostis canina*) should do well on poor manuka country in the Tolaga Bay district. I should advise using about 2 lb. per acre. Other grasses suggested are—10 lb. *Danthonia pilosa*, 5 lb. cocksfoot, 3 lb. tall fescue, ratstail, red-top, and white clover. If white clover does not succeed, suckling might be used. It does not give much feed, but a legume of any description is advisable in all pasture mixtures. It is also probable that Yorkshire fog (cleaned) would be quite a good grass to bulk up the mixture with. The fog will help to cover the ground rapidly, and will later be replaced by the danthonia and other more permanent grasses when the fog thins out. The use of fog may be looked upon as a peculiar suggestion, but I am confident it is superior to using rye-grass on land where the rye disappears after the first and second years.

APPLE-TREES.

H. J., Aporo, via Nelson :—

Would you kindly advise the best way to treat apple-trees which have been badly barked by hares ?

The Orchards, Gardens, and Apiaries Division :—

There is no method of treating apple-trees once attacked by hares. If not seriously injured the trees should recover. The only satisfactory means of protecting them from these animals is to run wire netting round the orchard to a height of about 3 ft., letting the netting into the ground about 4 in.

Will "Farmer" and "Inquirer," Whangarei, please furnish their names and addresses, as the Department wishes to communicate with them direct ?—ED.

Following are the numbers of visitors at the experimental farms during the month of August: Ruakura Farm of Instruction, 627 ; Tauranga Experimental Farm, 102 ; Waerenga Experimental Farm, 97 ; and Moumahaki Experimental Farm, 30.

THE SHEEP RETURNS.

THE following figures show the numerical strength of the sheep flocks of New Zealand on the 30th April, 1913, the tables being the summarized section of the annual sheep returns of the Dominion presented to Parliament on the 3rd September.

NUMBER OF SHEEP IN EACH DISTRICT AT 30TH APRIL, 1913.

North Island.

—	Auckland Sheep District.	Napier-Gisborne Sheep District.	Wellington - West Coast Sheep District.	Total North Island.
Stud Sheep and Flock Rams—				
Merino	1,668	2,122	6,571	10,361
Lincoln	7,392	28,011	50,979	86,382
Romney	18,813	85,875	115,056	219,744
Border Leicester	915	4,811	4,294	10,020
English Leicester	2,607	4,902	3,320	10,829
Shropshire	3,197	803	2,821	6,821
Southdown	376	7,911	17,495	25,782
Other breeds	380	2,111	4,287	6,778
Totals	35,348	136,546	204,823	376,717
Flock Sheep—				
Crossbred and other longwools ..	1,294,145	5,640,708	5,806,993	12,741,846
Merino	10,825	2,947	13,110	26,882
Grand totals	1,340,318	5,780,201	6,024,926	13,145,445

South Island.

—	Marlborough-Nelson-Westland Sheep District.	Canterbury-Kaikoura Sheep District.	Otago Sheep District.	Total South Island.
Stud Sheep and Flock Rams—				
Merino	9,843	19,086	13,330	42,259
Lincoln	3,660	3,278	2,883	9,821
Romney	13,562	9,880	58,426	81,868
Border Leicester	590	32,990	40,815	74,395
English Leicester	5,490	62,298	5,507	73,295
Shropshire	1,026	10,017	1,728	12,771
Southdown	163	12,045	114	12,322
Other breeds	2,824	24,018	12,052	38,894
Totals	37,158	173,612	134,855	345,625
Flock Sheep—				
Crossbred and other longwools ..	1,015,170	4,332,189	3,918,210	9,265,569
Merino	245,959	687,890	501,322	1,435,171
Grand totals	1,298,287	5,193,691	4,554,387	11,046,365

Totals.

—	North Island.	South Island.	Total in Dominion.
Stud Sheep and Flock Rams—			
Merino	10,361	42,259	52,620
Lincoln	86,382	9,821	96,203
Romney	219,744	81,868	301,612
Border Leicester	10,020	74,395	84,415
English Leicester	10,829	73,295	84,124
Shropshire	6,821	12,771	19,592
Southdown	25,782	12,322	38,104
Other breeds	6,778	38,894	45,672
Totals	376,717	345,625	722,342
Flock Sheep—			
Crossbred and other longwools ..	12,741,846	9,265,569	22,007,415
Merino	26,882	1,435,171	1,462,053
Grand totals	13,145,445	11,046,365	24,191,810

—	Auckland Sheep District.	Napier-Gisborne Sheep District.	Wellington-West Coast Sheep District.	Marlborough-Nelson-Westland Sheep District.	Canterbury-Kaikoura Sheep District.	Otago Sheep District.	Total in Dominion
Stud rams ..	1,813	1,535	4,644	559	2,754	1,851	13,156
Flock rams ..	15,263	73,093	78,162	16,623	65,149	52,244	300,534
Wethers ..	182,395	727,881	765,694	192,686	611,892	727,002	3,207,550
Breeding-ewes	687,239	2,838,883	2,979,369	683,342	2,984,576	2,347,627	12,521,036
Dry ewes ..	65,053	340,764	323,820	47,349	191,617	195,104	1,163,707
Lambs ..	388,555	1,798,045	1,873,237	357,728	1,337,703	1,230,559	6,985,827
Totals ..	1,340,318	5,780,201	6,024,926	1,298,287	5,193,691	4,554,387	24,191,810

Merino and Longwools shown separately.

—	Males.	Females.	Totals.
Merino	641,819	872,854	1,514,673
Crossbred and other longwools	6,372,332	16,304,805	22,677,137
Totals, 1913	7,014,151	17,177,659	24,191,810
" 1912	6,901,959	16,848,194	23,750,153
Increase	112,192	329,465	441,657

Number of Ewes in the Dominion (Stud and Flock).

Year.	North Island.		South Island.		Dominion.	
	Breeding-ewes.	Dry Ewes.	Breeding-ewes.	Dry Ewes.	Breeding-ewes.	Dry Ewes.
30th April—						
1904	4,465,292	629,184	4,757,156	413,663	9,222,448	1,042,847
1905	4,859,547	349,191	5,219,637	360,187	10,079,184	709,378
1906	5,113,798	481,525	5,365,389	451,209	10,479,187	932,734
1907	5,472,818	501,494	5,264,028	493,508	10,736,846	995,002
1908	5,698,865	626,687	5,545,176	540,158	11,244,041	1,166,845
1909	6,356,783	580,092	6,013,563	435,167	12,370,346	1,015,259
1910	6,456,509	690,435	6,058,871	518,078	12,515,380	1,208,513
1911	6,354,874	751,817	5,969,589	560,643	12,324,463	1,312,460
1912	6,393,460	755,906	5,883,569	579,857	12,277,029	1,335,763
1913	6,505,491	729,637	6,015,545	434,070	12,521,036	1,163,707

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE THREE MONTHS ENDED 31ST AUGUST, 1913.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. Hinds.	Beef. Fores.
1913.							d.	d.	d.	d.	d.	d.
June 7	..	..	..	..	..	..	4½	4¼	6½	6⅛	3⅞	3⅛
„ 14	..	..	..	..	..	..	4½	4¼	6½	6⅛	3⅞	3¼
„ 21	..	..	..	..	..	..	4½	4¼	6⅜	6	3⅞	3¼
„ 28	..	..	..	..	..	..	4½	4¼	6¼	5⅞	4	3¼
July 5	..	..	..	..	..	..	4½	4¼	6	5⅝	4⅛	3⅛
„ 12	1/3¾	1/4	1/4¾	1/8¼	1/11	2/4¾	4⅜	4¼	5¾	5⅜	4⅛	3⅛
„ 19	..	..	..	..	..	..	4⅜	4 3/16	5 11/16	5¼	..	..
„ 26	..	..	..	..	..	..	4 5/16	4 3/16	5¾	5 5/16	4⅛	3⅛
Aug. 2	..	..	..	..	..	..	4¼	4⅛	5⅜	5¼	4	3 1/16
„ 9	..	..	..	..	..	..	4¼	4⅛	5 9/16	5⅜	4	3
„ 16	..	..	..	..	..	..	4 3/16	4⅛	5½	5⅜	..	..
„ 23	1/3⅝	1/3¾	1/4½	1/7¾	1/10½	2/4¼	..	..	5½	5⅛	..	..
„ 30	..	..	..	..	..	2/3¾	4 3/16	4 3/16	5 9/16	5⅛	4⅛	3

London Date.	Butter. New Zealand.	Butter. Danish.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila.	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila.	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
June 7	115/0	115/0	60/6	58/6	..	29/0/0	26/0/0	31/0/0	29/0/0	26/0/0	31/0/0	..	39/0	..	21/6
„ 14	113/0	116/6	60/6	58/6	..	28/10/0	25/0/0	29/10/0	28/10/0	25/0/0	29/10/0	..	..	23/0	21/6
„ 21	113/0	121/0	61/6	59/6	60/6	28/10/0	24/15/0	30/0/0	29/0/0	25/0/0	29/10/0	..	..	..	..
„ 28	115/0	..	63/6	61/6	62/0	30/0/0	26/10/0	30/0/0	30/10/0	27/0/0	29/10/0	..	..	..	..
July 5	..	..	65/6	63/6	65/0	29/10/0	26/0/0	29/0/0	29/10/0	26/0/0	29/0/0	37/0	39/0	22/6	20/0
„ 12	..	..	67/0	65/6	65/6	29/0/0	25/0/0	..	..	..	29/0/0	..	..	..	..
„ 19	..	..	66/6	65/6	64/6	29/0/0	24/15/0	29/10/0	29/10/0	25/0/0	29/10/0	..	39/6	..	21/6
„ 26	..	..	..	..	..	..	25/0/0	..	..	25/10/0	30/10/0	..	..	..	..
Aug. 2	..	..	66/0	66/0	66/0	30/10/0	26/10/0	31/0/0	30/10/0	26/0/0	31/10/0	..	..	..	..
„ 9	..	..	67/0	66/0	..	31/10/0	27/10/0	31/10/0	32/0/0	28/0/0	31/10/0	..	..	..	..
„ 16	..	..	67/0	66/0	66/0	32/0/0	28/0/0	31/10/0	32/0/0	28/0/0	32/0/0	..	..	..	..
„ 23	..	..	..	..	..	31/0/0	27/0/0	31/0/0	31/5/0	27/5/0	30/10/0	..	..	..	..
„ 30	..	..	..	..	..	30/0/0	26/10/0	31/10/0	30/15/0	26/15/0	30/10/0	..	..	..	..

HEMP AND TOW GRADING RETURNS.

AUGUST.

Hemp.—The total number of bales graded was 8,153, as compared with 4,431 for the corresponding month of last year, an increase of 3,722 bales. For the twelve months ending 31st August, 1913, the number of bales graded was 154,249, as compared with 91,166 for the previous twelve months, the increase being 63,083 bales.

Tow.—During the month 2,545 bales were dealt with, as compared with 1,139 for the corresponding month of last year, an increase of 1,406 bales. For the twelve months ending 31st August, 1913, the number of bales graded was 53,671, as compared with 25,388 for the previous twelve months, the increase being 28,283 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF AUGUST, 1913.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.	Common.	Rejected.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	226	869	135	..	..	1,230
Napier ..	..	..	..	..	..	..	..	..
Foxton ..	..	..	369	3,102	41	15	..	3,527
Wellington ..	..	14	870	1,573	200	9	..	2,666
Blenheim ..	..	..	177	..	..	..	..	177
Picton ..	..	59	43	94	2	..	..	198
Lyttelton ..	..	..	..	..	..	..	..	..
Timaru ..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	37	23	9	..	..	69
Bluff	..	..	26	230	30	..	..	286
Totals ..	..	73	1,748	5,891	417	24	..	8,153
Percentages of totals	..	0·89	21·44	72·26	5·11	0·3	..	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	120	331	97	548
Napier	..	..	..	..	..
Foxton ..	24	646	181	34	885
Wellington ..	70	288	421	15	794
Blenheim ..	..	76	51	..	127
Picton	59	26	..	..	85
Lyttelton ..	..	..	..	..	..
Dunedin ..	..	..	16	12	28
Bluff	..	6	52	20	78
Totals ..	153	1,162	1,052	178	2,545

Stripper-slips.—Passed for export: Foxton, 106; Wellington, 109—total, 215. Condemned: Foxton, 10; Wellington, 18—total, 28.

NEW ZEALAND-SAN FRANCISCO TRADE.

THE following are the shipments of produce for San Francisco, Rarotonga, and Tahiti, and transhipments for Vancouver from New Zealand, since April last:—

—	"Tahiti," 25th April.	"Moana," 23rd May.	"Aorangi," 20th June.	"Tahiti," 18th July.	"Moana," 15th August.
Gum, packages	..	30	45	6	34
Seeds, sacks	61	..	800	450	23
Grain, &c., sacks	115	84	59	75	72
Meat, cases	250	355	154	152	205
Onions, cases	8	19	13	5	10
Potatoes, sacks	10	27	24	9	15
Sundries, packages ..	235	210	122	370	157
Butter, boxes	405	8	4	792	7
Hemp, bales	271	394	262	371	391
Frozen lamb, carcases ..	2	2	2	2	2
,, mutton, ,, ..	..	..	..	30	54
,, veal, ,, ..	..	..	..	..	..
,, beef, quarters ..	..	..	..	32	..
,, sundries, packages ..	13	..	..	5	5
Timber, pieces	..	..	1,151	..	..

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since March last:—

—	"Marama," 14th March.	"Makura," 12th April.	"Niagara," 10th May.	"Marama," 6th June.	"Makura," 5th July.	"Niagara," 2nd August.
Butter, boxes ..	9,402	6,535	465	1,210	4,401	720
Mutton, carcases	..	..	1,291	50	65	1,014
Beef, quarters ..	1,254	2,428	5,492	2,271	3,520	7,195
Veal, carcases ..	400	402	324	..	..	..
Frozen sundries, packages	147	86	79	90	471	42
Wool, bales ..	..	..	50	351	835	..
Grass-seeds, beans, &c., sacks	..	147	..	..	75	..
Hides and skins, sacks, &c.	..	249	270	1,675	748	200
Onions, cases ..	..	732	25	..	..	..
Sheep-skins, bales	..	24	..	..	522	..
Jam, cases ..	175	25	91	75	20	1
Sundries, packages	214	470	112	103	[illegible]	..
Potatoes, crates	..	..	..	..	..	..
Kauri-gum, packages	41	7	150	44	..	..
Hemp, bales ..	126	..	126	167	97	930
Rabbits, crates..	..	..	..	500	15	100

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of August :—

Port of Shipment.	Horses.		Cattle.		Sheep.			Dogs.		Poultry, in Crates.		Pigs.
	To Australia.	To Pacific Islands.	To America.	To Pacific Islands.	To Australia	To Pacific Islands.	To South America.	To Australia.	To America.	To America.	To Pacific Islands.	To Pacific Islands.
Auckland ..	1	4	30	19	..	105	..	..	1	1	3	6
Napier ..	..	..	..	..	..	..	..	..	..	..	..	..
Wellington	8	..	..	..	94	..	..	2	..	..	..	..
Lyttelton ..	3	..	..	..	68	..	..	..	..	..	..	..
Dunedin ..	..	..	..	..	12	..	..	7	..	..	..	..
Totals ..	12	4	30	10	174	105	..	9	1	1	3	6

The following are particulars of horses shipped : Draughts—1 mare ; thoroughbreds—15 mares, 1 colt, 5 geldings ; harness—1 gelding ; ponies—2 mares ; trotting —1 stallion.

The following are particulars of sheep exported : Lincoln—2 rams, 20 ewes ; Romney—3 rams, 35 ewes ; English Leicester—2 rams, 78 ewes ; merino—2 rams, 10 ewes ; Border Leicester—1 ram, 11 ewes ; Corriedale—8 rams.

The following are particulars of cattle exported : Fat cattle—105 ; dairy cows 24 ; dairy heifers—6 ; shorthorn heifers—4 ; shorthorn bulls—3.

PRODUCE IMPORTED.

THE following return, compiled by the Customs Department, shows the total importations into New Zealand during the month of August, 1913, of agricultural and farm products :—

Item.	Quantity.	Value in
		£
Bran	..	..
Butter	..	..
Cheese	13 cwt.	65
Chaff	526 tons	2,244
Fruits, fresh, all kinds	2,359,566 lb.	19,768
Barley	5 centals	10
Oats	134 centals	59
Wheat	..	..
Onions	6,369 cwt.	2,973
Pollard and sharps	48 tons	195
Potatoes	11 tons	149
Seeds, grass and clover	814 cwt.	2,170
Total value imported ..	..	£27,633

STOCK IN QUARANTINE.

THE following stock were received into quarantine during the month of August :—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			MOTUIHI ISLAND (AUCKLAND).		
19	Holstein cattle ..	Male..	Montreal..	Gunn and Sinclair (D. and Co.)	Auckland.
8	,, ..	Female	,, ..	Ditto	,,
1	Collie dog ..	,,	New Plymouth	J. Grant (N.Z. Express Company)	,,
			SOMES ISLAND (WELLINGTON).		
5	Shorthorn heifers..	Female	Sydney ..	C. F. Murray ..	Blenheim.
2	Jersey cows ..	,,	London ..	J. G. Harkness ..	Wellington.
8	Jersey heifers ..	,,	,, ..	,, ..	,,
1	Jersey heifer calf..	,,	,, ..	,, ..	,,
1	Holstein bull ..	Male..	San Francisco	John Donald ..	Wanganui
2	Holstein heifers ..	Female	Ditto ..	,, ..	,,
1	English setter ..	Male..	London ..	W. N. Adams ..	Nelson.
1	,, ..	Female	,, ..	,, ..	,,
			QUAIL ISLAND (LYTTELTON).		
1	Guernsey calf ..	Female	Melbourne	H. S. Kyle ..	Sockburn.
1	Pomeranian dog ..	Male..	London ..	J. Addison ..	Christchurch.
3	Pomeranian dogs..	Female	,, ..	,, ..	,,
1	Collie bitch ..	,,	,, ..	J. Lilico ..	Lochiel.

The steamer "Arawa," which sailed from Wellington for London on the 7th ultimo, had on board the following cargo for Monte Video: From Wellington —507 packages agricultural machinery, 24 packages fruit-trees, 3 cases sheep-drench, and 26 rams; from Dunedin—630 sacks oats.

The steamer "Ruahine," which sailed from Wellington for London on the 21st ultimo, had on board the following cargo for Monte Video: From Melbourne —77 cases agricultural machinery, 20 iron wheels, 2 bundles poles, 10 wooden rollers, and 35 live sheep; from Sydney—1 case saddlery; from Wellington—9 wool presses.

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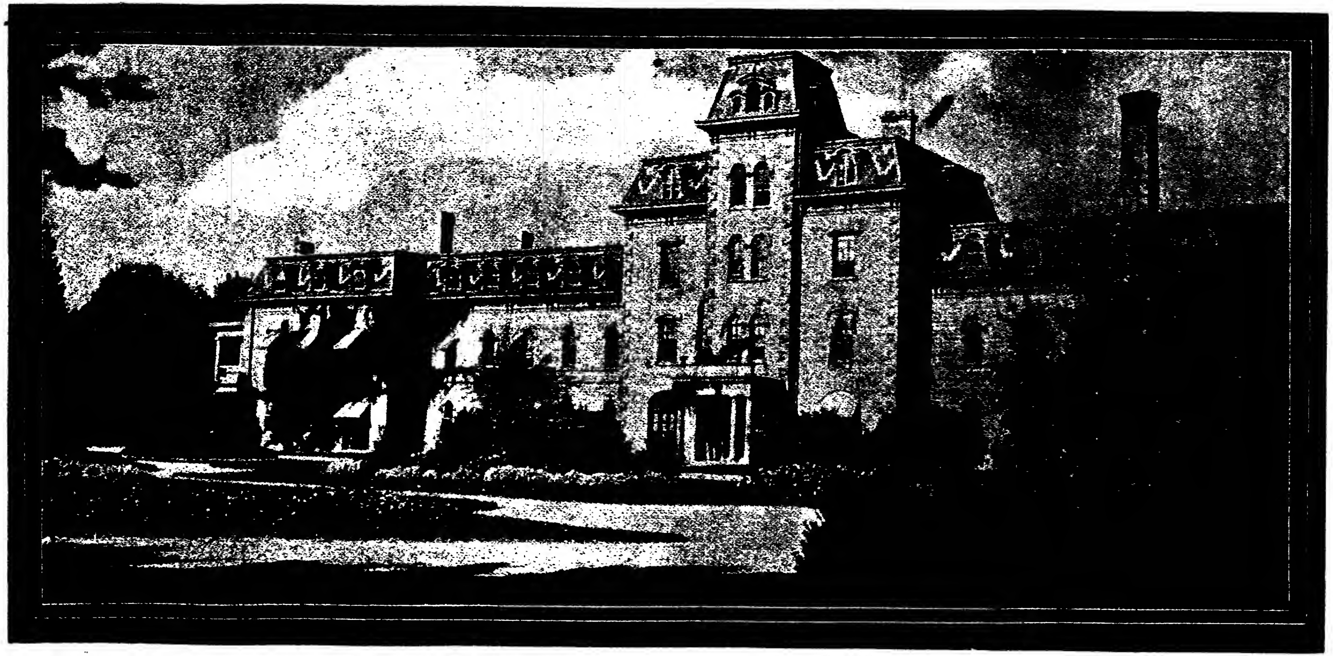


Ontario Agricultural College, Guelph.

The

Journal of Agriculture.

VOLUME VII, No. 4. | WELLINGTON, N.Z., 20TH OCT., 1913. | PRICE, SIXPENCE

ONTARIO AGRICULTURAL COLLEGE.

A. McTAGGART, M.S.A. (CORNELL), B.S.A. (TORONTO).

THE material well-being of any nation is dependent very largely upon its agricultural industries. Ontario early recognized this great fact. In 1874, to meet the pressing needs of her rural population, she established the Ontario Agricultural College at Guelph. By reason of her climate she was confronted with rural problems which could be solved only by the establishment of such an institution. In 1875, according to the first President, the great majority of Ontario farmers were depending solely on increased acreage for increased returns. Briefly stated, the main objects in the establishment of the College were—"(1) To train young men in the science and art of improved husbandry; and (2) to conduct experiments and to publish the results." From humble beginnings and against "precedent, prejudice, and general con-

servatism" the College has evolved. To-day it is a great force in the country, sending forth its influence far beyond the confines of Ontario. To east and west, to north and south, Guelph sends forth its men as apostles of the new agriculture. To her halls of learning come not only the sons of Canada and of the United States, but also students from foreign lands, to imbibe the principles underlying the science and practice of agriculture, and thus equip themselves for life on the farm or for the teaching of the principles of modern farming to their fellow-countrymen.

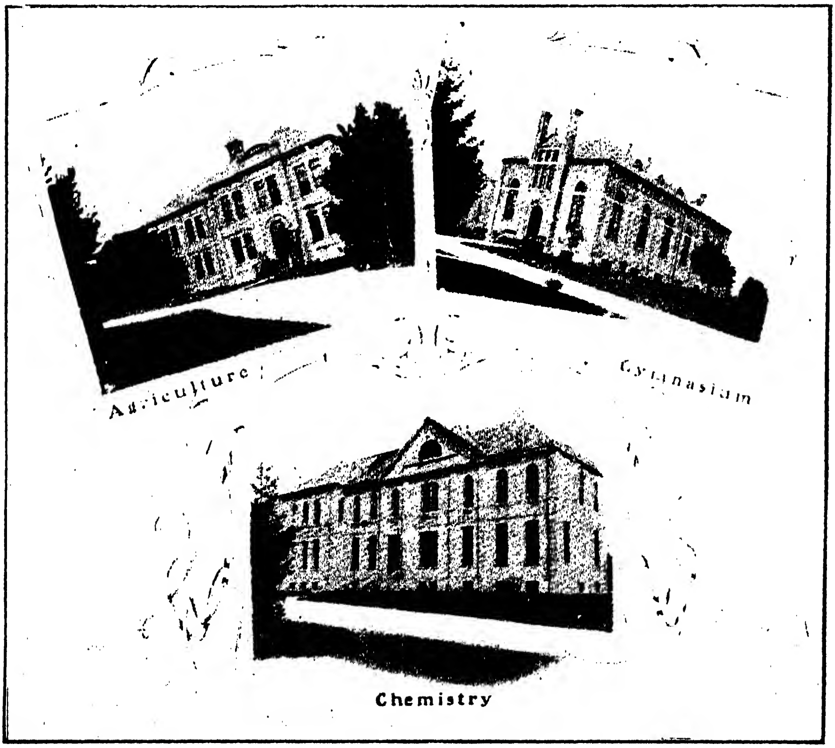
G. C. CREELMAN. B.S.A., M.S., LL.D., PRESIDENT.

The institution has connected with it, approximately, 600 acres, the greater part of which is brought into cultivation under the definite rotation practised on the farm. Some 50 to 75 acres of this area comprise the experimental farm, where the field husbandry department conducts experiments in the testing and improvement of cereals, forage crops, and grasses, and generally demonstrates the most approved systems of rotation. The remainder of the College land is devoted to orchard and garden experimentation and demonstration work, poultry-runs, and the well-laid-out grounds and drives with which the institution is provided.

The buildings, which are erected in stone or brick, are for the most part neatly arranged along the north and east sides of the picturesque campus of which the College boasts. Adding greatly to the beauty of the place are breakwinds of spruce, stately pines adjacent to the campi, rows of maple on either side of the driveways, and shrubbery skirting the various walks. The main building contains the administrative offices, post-office, and dormitories for some 218 students. Other buildings are set aside for the study of chemistry, animal husbandry and bacteriology, field husbandry, horticulture, physics and biology, dairying, and poultry-keeping. Some of these are provided with greenhouses for experimental purposes. Not an unimportant feature of the building equipment of Guelph is the Massey Hall and Library, the gift of the late Mr. Hart Massey, of Toronto. It consists of a spacious hall for college meetings and a most up-to-date library, providing every facility for quiet study and possessing in its "stack-room" many thousands of books. A distinct feature of the chemical building is the equipment provided for

the study of the milling and baking qualities of wheat and for the analysis of the products of the experiment station. A large hall and gymnasium, used for physical exercises and for concert purposes, is also part of the College building equipment.

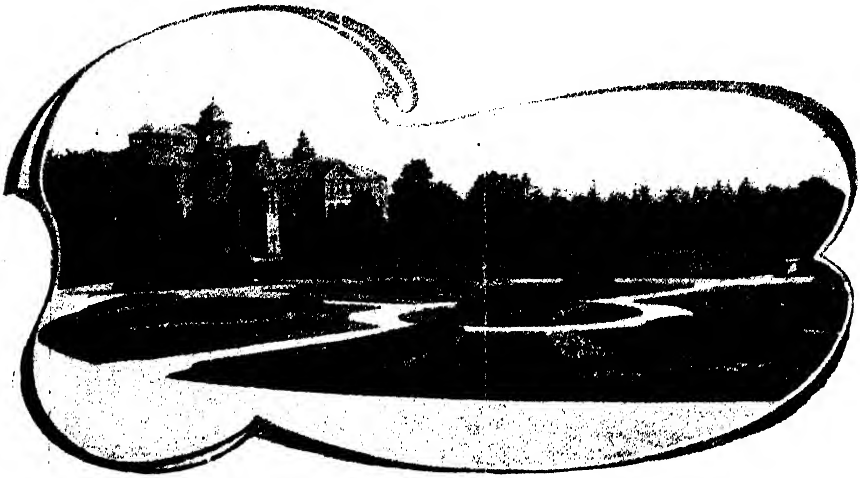
The animal-husbandry department is furnished with a spacious stock-judging pavilion, built on the principle of the covered amphitheatre. Other buildings used by this department are two large barns provided with stalls, silos, root-cellars, grain bins and



The Agriculture, Gymnasium, and Chemistry Buildings.

shoots, hay-storage space, and other convenient equipment. One barn is devoted exclusively to the various breeds of dairy cattle, while the other houses the beef-cattle. Attached to the latter building is accommodation for horses and sheep. When stall-fed all the stock are given a definite ration, the daily weight of which is known, and gains made from time to time by the animals are recorded. Thus experimentation and farm practice go hand-in-hand. Experiments are conducted by this department in the breeding and feeding of heavy horses, beef cattle, dairy cattle, sheep, and swine.

In addition to the 350 students taking the regular courses of the College, several hundred farmers and farmers' sons take the short courses provided in winter by the institution. For the special benefit of those not able to spend a prolonged period in the study of agriculture in its various forms a three-months course in dairying, a two-weeks course in stock and seed judging, a four-weeks course in poultry-raising, and a two-weeks course in fruitgrowing are provided. All these courses are very popular. The stock- and seed-judging course is specially well attended. Beef-animals are raised by the College for this purpose. The animals are judged by the farmers, and are subsequently slaughtered. The carcases are judged, and the results compared



The Massey Hall and Library.

with the decision given before slaughter. Thus a great object-lesson is afforded the Ontario feeder. An expert in the meat trade from Kansas City annually visits the College for this short course, and instructs farmers and students alike in this special phase of production. Excellent specimens of other breeds of live-stock are also brought into the ring for judging purposes. A special feature of these short courses is the practical demonstration.

One of the chief adjuncts to the important work of the College is the work of the Experimental Union. Seed of approved varieties of cereals and other farm crops are sent out in the spring to farmers who desire to experiment and who promise to carry out the instructions of the field husbandry department and report their results to the College. Some two thousand farmers are engaged

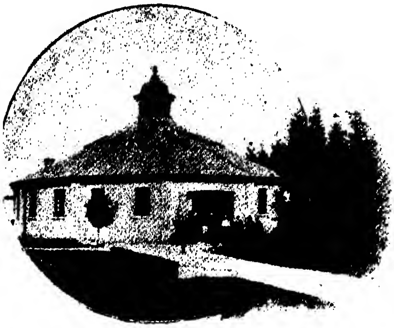
in this experimentation work all over the province. The results are carefully investigated and tabulated at the College. The annual meetings of the Union take place at the institution, where addresses are given, questions asked and dealt with, and the work of the Experimental Union discussed. Other departments of the College also carry out experimental work under the auspices of the Union. For instance, the bacteriological department send to farmers pure cultures of legume bacteria on the condition that the local results are reported. The value to Ontario of these experiments in popularizing the College, and the productions of its laboratories

Reading-room of the Massey Library.

and experimental fields, and of the discussions of the Union, is very great. It has been said that the production of the O.A.C. No. 21 barley at the College and its distribution through the Union alone has meant to Ontario a benefit equivalent to a sum of money which could build and maintain no fewer than ten Ontario Agricultural Colleges.

From the above sketch it can readily be seen that the Guelph College is a mighty force contributing largely to the building-up of the great Dominion of Canada. It is peculiarly adapted to the needs of the Canadian farmer, giving instruction to his boy in the winter without taking away his much-needed help in the

summer, solving his problems, and generally advancing the agricultural and commercial interests of his country. Thus it is conducted on the most economical lines for all concerned—student, farmer, country. The Guelph College is literally "a gigantic winter course" for the son of the working-farmer, making for the uplift of Canada.



The Stock-judging Pavilion.

Adjoining the Agricultural College, and also under the able presidency of Dr. Creelman, is the Macdonald Hall, an Institute where farmers' daughters and others are trained in the mysteries of domestic science. This is due to the munificence of Sir William C. Macdonald, of Montreal, the founder of Macdonald College, Quebec.

During the summer courses for teachers are held at Guelph, where they are taught elementary agriculture, nature-study, and manual training.

From time to time the services of College professors and instructors are enlisted to address meetings of farmers, or to man a "Better-farming Special-train," which in the winter periodically traverses parts of the province under the auspices of the Ontario Department of Agriculture. Thus the College reaches the farmer with instruction in various ways. It is not to be wondered at, then, that its fame has gone far beyond the confines of the province and of Canada itself.

As showing the esteem in which the agricultural colleges of Canada are held by those in authority, and the importance of agricultural education generally, no less a sum than 10,000,000 dollars (£2,000,000) was recently voted by the Dominion Parliament. The main object of this huge grant is to "increase the efficiency and equipment of the agricultural colleges, establish agricultural, dairying, and horticultural schools, to initiate agricultural teaching in public schools, and otherwise to provide education for the farming community. Assistance is also to be given to the training of teachers in domestic science."

If all half-crowns were as well invested as a yearly subscription to the *Agricultural Journal* things *would* "hum."—*A Manapouri Subscriber.*

INKWEED:

ITS VALUE AS A POISON.

"Herewith I forward you a sample of juice taken from the berries of the common inkweed, with a view to having it analysed," writes Mr. Chris. M. Hansen, of Matahanea. "I have accidentally found that it is a poison of some sort. When doing roadwork one day, it became necessary to clear a quantity of it away. I had no crook with me to cut it, so I took hold of it with my bare arms to break it off, as it is very brittle, with the result that my arms became saturated with the juice therefrom, which looked like blood. It commenced to burn, and small pimples appeared on the skin, and I found relief by bathing it in water. I should like to know if it could be of any commercial value as a poison. The Maoris use it as ink, and it is not a bad substitute if nothing else is available. I have tried it for staining wood. It turned out admirable, with white varnish over it. No other stain can beat it. I may add that this inkweed is taking possession of roadsides; and in this locality in broken country there are whole paddocks where nothing else is growing, and it increases abundantly. I would have forwarded a sample of the berries, only they are over-ripe. I send you a green stalk instead. Kindly let me know through the *Journal* if it could be turned to good account."

Mr. A. H. Cockayne, Biologist of the Department, comments thus on Mr. Hansen's communication:—

Inkweed, or pokeweed (*Phytolacca octandra*), is a poisonous plant. In Pammel's Manual of Poisonous Plants the following account of the poisonous properties of this plant is given: "The young shoots of this plant may be boiled and eaten, the acrid property being dissipated in boiling. The leaves are eaten by the Natives of the Islands of Guam. A tincture of the plant is used for rheumatism. The root is alterative, emetic, cathartic, and narcotic."

Professor Chesnut, in speaking of its poisonous nature, says, "Most instances of poisoning arise from an overdose when the plant has been used as a medicine, but there are also accidental cases due to eating of the root, which has been variously mistaken for that of the parsnip, artichoke, and horse-radish. A few fatal cases of poisoning of children have been attributed to the fruit, but whether

death was really due to the seed or the pulp is somewhat uncertain. The evidence is chiefly against the seed, for it is known to contain a poisonous substance. Inkweed is a violent but slowly acting emetic, vomiting beginning only after about two hours. It also effects the nerves and muscles, producing retching spasms, severe purging, and sometimes convulsions. Death is frequently due to paralysis of the respiratory organs."

Dr. Guttenberk makes a similar report in regard to effects of poisoning by inkweed, adding that death often is a result: "The roots of inkweed are often mistaken for other fleshy roots, such as horse-radish. The leaves, as has been said, are harmless when boiled, somewhat resembling spinach, but the root is very poisonous. The inkweed-root was used by the Indians in medicine."

Dr. Millspaugh, who values the plant not only as emetic, but also as an efficient remedy, says, "In certain forms of rheumatism, the root, with lard, was found to be an excellent ointment as a cure for many forms of skin-diseases—psoriasis, eczema, capitis, and tinea circinata; also in syphilitic ulcers."

Dr. Millspaugh also says, "The fresh root, gathered late in autumn or early in spring, is chopped and pounded to a pulp and weighed. Two parts by weight of alcohol are taken, and, after thoroughly mixing the pulp with one-sixth part of it, the rest of the alcohol is added. After having stirred the whole, pour it into a well-stoppered bottle and let it stand eight days in a dark, cool place. The tincture is then separated by decanting, straining, and filtering. Thus prepared, it has a light-straw colour by transmitted light, at first a stinging, soon followed by a decided bitter taste, and a very slight acid reaction." He adds, "I noted in my readings several years ago that the berries had been used for pies by frugal house-wives, and often since have half determined to try inkberry pastry: discretion has, however, always overruled valour, and the much-thought-of pie is still unmade and uneaten. The young shoots, however, make an excellent substitute for asparagus, and I much prefer them, if gathered early and discriminately."

The acrid alkaloid phytolaccin, according to Dr. Edmond Preston, occurs in the root of this plant; also phytolaccin acid and an amorphous yellowish-brown transparent substance, very soluble in water and alcohol. Nagi reports a toxic substance phytolaccotoxin. The berries have been used for colouring, but this is not entirely successful, because no mordant will fix the colour. The juice of the berry is a delicate test for acids when lime-water is added to it.

Dr. Johnson says, "All parts of the plant possess acrid and somewhat narcotic properties. The juice of the fresh plant, or a

strong decoction of the root, applied locally may strongly irritate the skin, especially if tender or abraded. Taken internally, it causes nausea, vomiting, and purging, and, in overdoses, acro-narcotic poisoning. It has been employed with more or less satisfaction in a great variety of cutaneous affections, and in rheumatism, especially when chronic or of syphilitic origin. There is little doubt that, in view of the uncertainty which at present exists regarding it, this plant would well repay further careful experimentation."

Nagi reports that "Phytolaccotoxin resembles picrotoxin and cicutoxin. A glucoside has also been found in common inkweed; saponin also occurs."

In New Zealand stock never appear to touch this plant.

A POTATO EXPERIMENT.

A. W. Green.

In order to discover what condition a seed potato should be in to give the best results, an experiment was conducted at the Ruakura Farm of Instruction during the past season. The variety chosen was Northern Star. The test was confined to the following variations of seed:—

(*a*.) Weak-eyed tubers.
(*b*.) Rooted sets.
(*c*.) Large cut sets.
(*d*.) Whole seed (egg-sized).

Rooted sets are tubers which had sprouted in boxes, but owing to excessive moisture had formed roots previous to planting.

The sets were planted on the 10th October, 1912, each selection being in a single row, 100 yards long. Manure used: 3 cwt. bonedust, 3 cwt. basic superphosphate, 3 cwt. Seychelles Island guano, and 1 cwt. sulphate of potash per acre. All the rows received similar cultivation and spraying. The weights given below are the actual results in pounds from 100 yards.

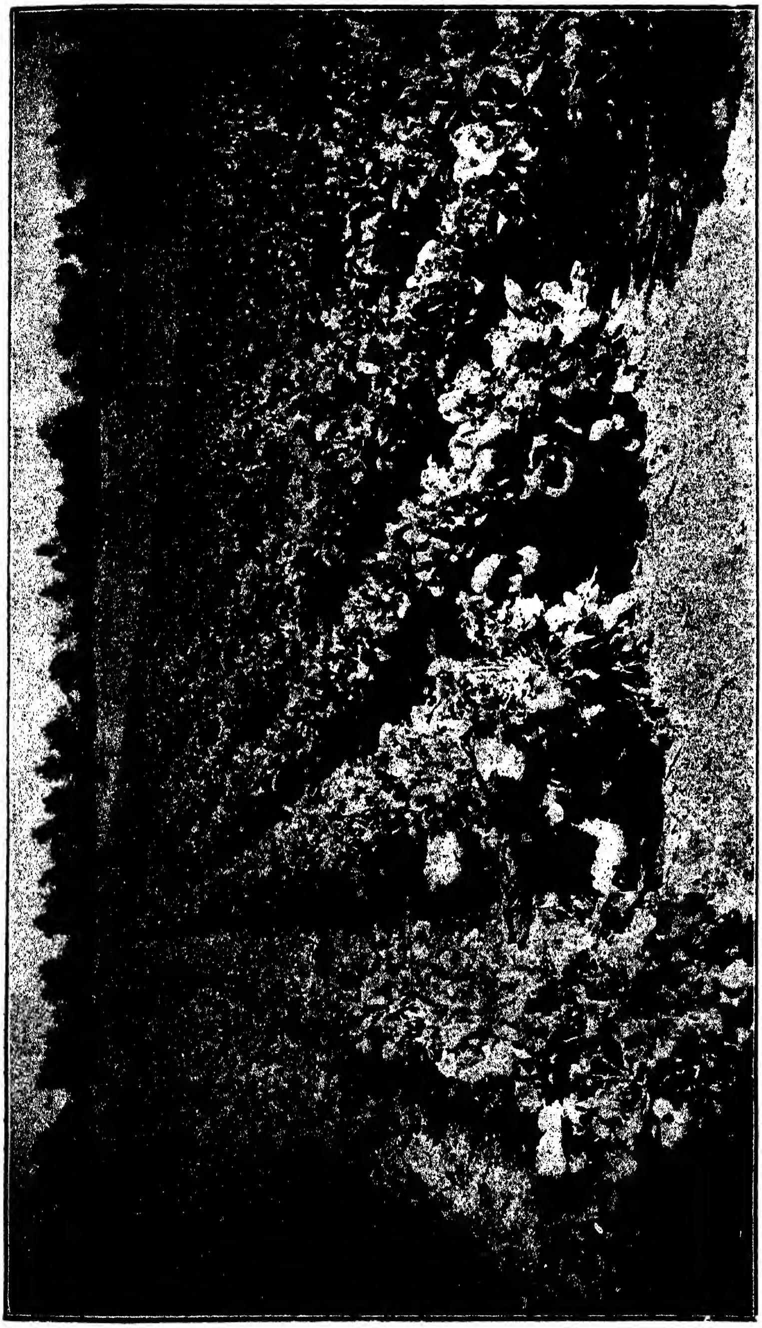
Plot.	Condition of Tubers.	Large.	Small.
		lb.	lb.
A	Weak-eyed sets	180	140
B	Rooted sets	359	185
C	Large cut sets	495	120
D	Whole seed (egg-sized) ..	475	139

RUAKURA FARM OF INSTRUCTION.

PROGRAMME FOR THE 1913–14 SEASON.

THIS season the scheme of plant-selection, experimental, demonstration, and educative work in general at the Ruakura Farm of Instruction has been planned on a more comprehensive scale than usual. A brief survey of the main activities in progress will no doubt prove of interest to the many farmers who are appreciating the work being done at Ruakura, and who take advantage of the lessons there conveyed in planning the work on their own farms.

Plant-selection.—The selection of outstanding individual plants for seeding purposes, in order to advance the standard of a particular type or variety or to secure a variation more immune to disease, is being continued with oats, wheat, barley, rye, swedes, mangels, and potatoes. In the cereal-testing, field plots have been planted with single-head selections of Rieti wheat, Cedar wheat, Cape barley, and Algerian oats. Mr. A. W. Green, who has charge of the plant-selection work, has also a number of selected heads taken from the crop of the Ruakura Rust-resistant oat of last year. These are being tested on a complete scale. Although it is believed that the Rust-resistant oat bred on the farm is substantiating the claims made for it, the originator believes that a still more valuable variety may yet be secured, especially in the direction of improving the colour, the quality, and the productivity. Oats, being the principal cereal in the North Island, naturally claim first consideration at Ruakura. In the cereal field, however, there are over eighty varieties of different grains under trial. These will provide material for plant-selection work this season. Among these are twenty-nine varieties of wheat, twenty-two of oats, thirty-one of barley, three of rye, three of Emmer, and two of spelt. Of these varieties, five of wheat and five of barley came from the New South Wales Government (in exchange for a parcel of Ruakura Rust-resistant oat seed); a variety of wheat, of oats, and of barley came from Guelph Agricultural College, Canada; and an oat (Tam Findlay) came from Scotland. Several varieties of grains were also received from Lincoln College, in exchange for seed of the Rust-resistant oat. Seed of the improved Black Winter Emmer (five heads) were received from the Wyoming Experimental Farm,



THE FIFTH GROWTH OF LAST SEASON'S RAPE CROP AT THE RUAKURA FARM OF INSTRUCTION.
This crop was ploughed in.

United States of America. Several farmers in the Dominion have sent seed from specially selected plants of grain, which are being tried at Ruakura.

The *Ruakura Rust-resistant Oat* is the principal grain crop of the farm this year. It is interesting to note that only four years ago this definite variety was but a single head of the Argentine oat, whereas this year over 100 acres are seeded with the produce. To test the Ruakura oat thoroughly for disease-resistance under varying conditions 1 lb. samples are being distributed to farmers throughout the Dominion. So far 206 samples have been forwarded to inquiring farmers. Samples have also been sent to different parts of the world, even to the far-distant Sitka Experimental Farm, Alaska, to British East Africa, and to the United States of America.

This year's extensive crop of the Rust-resistant oat is growing on every description of soil to be found on the farm. In one field it has followed the swede manurial-test plots of last season, receiving no assistance from manure beyond the residue left in the soil of the swede plots. The swedes, by the way, were not fed off, but were carted out to the stock. In another field the Rust-resistant oat has followed a green-manuring experiment, the field having grown a crop of tares and a crop of mustard, while a third of it was bare fallow. No artificial manure has been sown with the oats. At the present time that portion of the crop growing on the turned-in tares is considerably in advance of the others. In another paddock the oats followed rape, four growths of which were eaten down and the fifth ploughed under. This field, though no artificial manure was used with the oats, is looking the best of the many oat plots. Although eaten down during the last week in August, they presented a splendid appearance at the beginning of this month. This system of manuring oats is palpably cheap and effective.

Lucerne.—Extensive plantings of lucerne are being made this season. Several new varieties will be tested. By the first day of the present month lucerne in one of the older-established fields was ready to cut for hay. Further demonstrations as to the value of inoculated soil are to be conducted.

Root Crops.—A large number of varieties of swedes, turnips, and mangels will be tested, including the Garton's Superlative, from selected seed produced on the farm. Mangels from selected Ruakura seed are also included in these tests. Altogether about 30 acres are devoted to root tests, the land on which they are being grown having carried last year a crop of oats. After this

was harvested a catch-crop of barley and tares was grown, being fed off by dairy cows, and the residue ploughed in.

Top-dressing.—Experiments are in being to determine the influence of manures on the feeding-value of pastures. The superphosphate plot is still in the lead at the present time; each plot is carrying at the rate of fourteen sheep per acre.

Silver-beet.—Six acres will be devoted to tests with silver-beet. A feature of this work will be the selection of plants for seed-producing purposes. The crop will be tested with both sheep and cattle. A field of 15 acres at present seeded to the Ruakura Rust-resistant oat, sown on the swede manurial plots of last season, will be seeded to silver-beet in the beginning of next year, in order to provide sheep-feeding tests. As previously, the different plots will be kept quite distinct, the sheep being confined to one plot at a time—this to ensure the continuity of the manurial scheme in progress.

Artichokes.—An acre is being sown to artichokes in order to test further the value of these for pig-feeding purposes.

Perennialized Italian Rye-grass.—A field of 7 acres has been sown to this variety in order to test its claim to permanency. The field is being stocked carefully in order to give the grass every opportunity to become well established. A smaller area (2½ acres) has been sown to *Phalaris bulbosa* in order to test its value as a pasture grass.

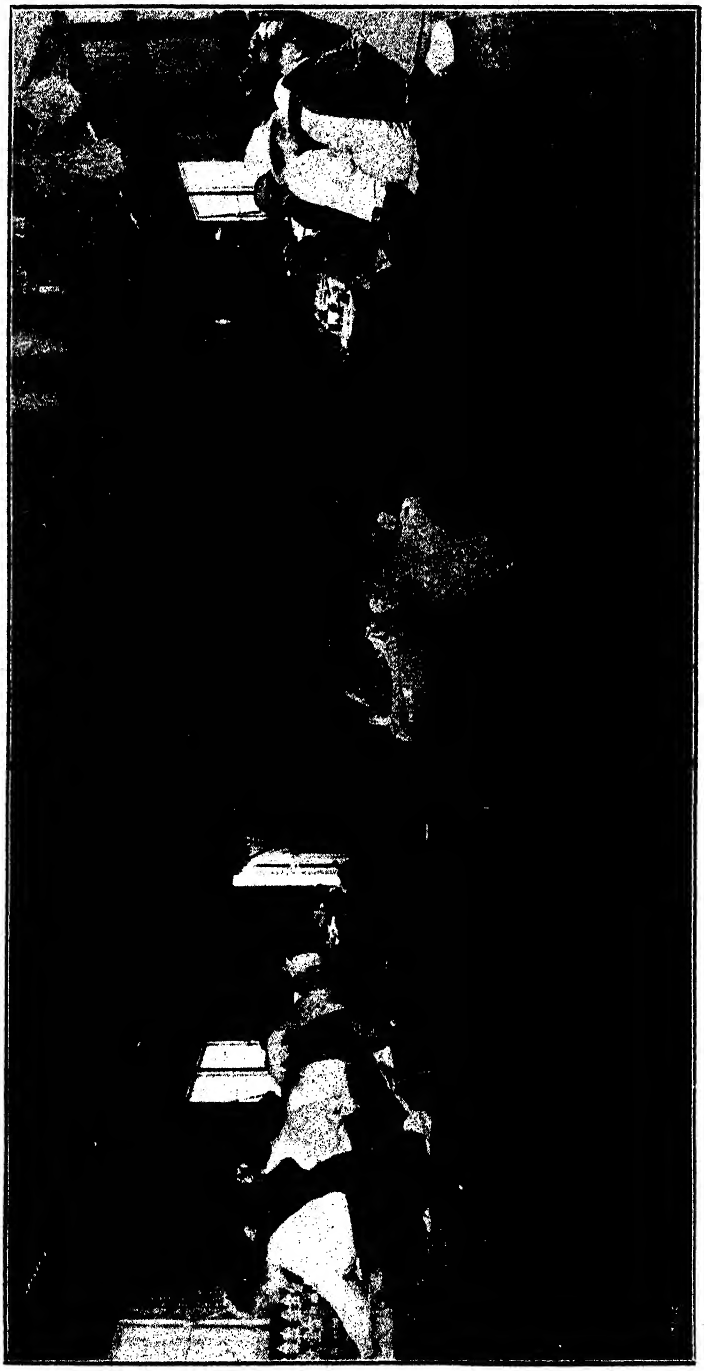
Potatoes.—Three acres are being devoted to potato tests, and the varieties to be tested will be considerably fewer than those experimented with last year.

Pot Experiments.—In order to arrive at a quicker and cheaper means of determining the manurial requirements of the poorer soils of the farm than that provided by extensive field tests, pot experiments are being conducted.

Clovers and Grasses.—A few new varieties of clovers are being tested, as well as varieties which have been selected on the farm by reason of their improved characters. The grass-testing plots are being extended to make room for a number of native and imported varieties.

The Orchard.—The principal work outlined for the orchard is the testing of varieties, an acre and a half having been planted this year. Different spraying-compounds are being tested, all the testing being done with the same varieties.

The Nursery.—Many new and interesting plants, principally for forage purposes, are being grown, among these being *guar* (a legu-



Hand-picking the Seed of the Ruakura Rust-resistant Oat.

minous plant), *Polygonum sachalinense* (a Japanese forage plant), nine varieties of salt-bush, White Lodino clover, mammoth clover, white-flowered cow-grasses, and a number of native grasses.

Decorticated Cotton Cake.—Experiments to test the value of decorticated cotton cake, purchased at a high price, for feeding to dairy stock against feeding on good pastures alone, are to be conducted.

Sheep.—The Southdown flock is being increased. There is an improving demand for Southdowns in the Auckland District, and farmers are appreciating the Ruakura stock. Although the environment would not appeal to one as being altogether suited to the Southdown, the flock is thriving and breeding true to type. This year's hoggets are most satisfactory. Though the English Leicester flock is a good typical collection the breed is not appreciated in the district. The demand being very limited, the flock is being kept within a small compass.

The fat-lamb experiments will be continued this year.

The Dairy.—The Shorthorn herd of the farm is being increased by the purchase of deep-milking cows of the Shorthorn type, pedigreed where possible, but always of a high grade. These are being put to a purebred Australian milking Shorthorn bull of the Darbalara strain. At the present time about thirty-five cows are in the Shorthorn herd. Seventeen Jersey cows are on the farm. The progeny of these promise to develop into fine cattle. In connection with the feeding of the dairy stock a number of fodder plants will be tested, including lucerne, maize, millets, tares, Western Wolths grass, and chou moellier.

Poultry. — In order to cope with the increasing demand for stock birds and sittings of eggs of the utility strains being specialized in, the houses and runs are being extended. At the end of last month the demand had considerably exceeded the supply, all orders beyond those then in hand having to be refused for Black Orpingtons, White Wyandottes, Pekin, and Aylesbury sittings. In all, over £50 had to be returned to those desirous of purchasing sittings. About 1,800 birds will be reared this season. The plant would require to be fully double its present size to meet the demand for sittings of eggs and stock birds, principally of the dual-purpose breeds (such as Black Orpingtons, White Wyandottes, and White Rocks), which are becoming very popular with the farming community.

Pigs.—A pedigree herd of Berkshires is being established. The system of running pigs in a field rather than in closed-in quarters is proving very successful at Ruakura.

Training the Farmer.—The accommodation for cadets is not only taxed to its utmost capacity, but over one hundred names are on the books of applicants seeking an opportunity to secure a practical training in modern agricultural methods with a modicum of theory imparted by experts. In connection with the theoretical side of the training provided for the cadets, lectures are given at weekly and fortnightly intervals on agriculture, dairying, veterinary science, and botany.

Conclusion. — The season at Ruakura Farm of Instruction is proving excellent for seed-germination, and at the beginning of the present month the prevailing conditions were favourable to all forms of plant-life.

BISULPHIDE OF CARBON:

ITS USE FOR ERADICATION OF GRASS-GRUB IN LAWNS AND GARDENS.

A. W. Green.

The use of bisulphide of carbon has previously been advocated for killing grass-grub. It is, however, considered too expensive a remedy for general field practice. The high price of the material prohibits the treatment of large areas, but for ridding lawns or gardens of the grub there is no method so effective. Not infrequently is a lawn dug up and resown on account of this pest having killed out the grass, and often the cause is erroneously put down to lack of moisture or absence of plant-food. The grub is a silent but a consistent worker. Where it is prevalent, digging and immediate resowing is no remedy, for when the young grass comes up the grub is still there to feed on its tender roots. Thus the value of a soil-fumigant which kills the grub is made apparent.

It has been observed that the grubs prefer the roots of some grasses to those of others, and it may be possible to select from the numerous varieties offered by seedsmen a suitable lawn-grass which would resist attack. To the writer the difficulty of securing such a grass appears to be increasing annually, for each season the number of plants added to the long list of those already attacked is considerable.

The common name "grass-grub" may be somewhat misleading. They not only eat grass-roots but are equally destructive on vege-

tables and the fibrous roots of trees, especially coniferous trees. They are most abundant in light sandy soil; they much prefer this to heavy clay. Even in small gardens they will be found restricted to patches of soil of the lightest and driest nature. Two plots of beet-root growing in the nursery at Ruakura illustrate this: No. 1, sown on light sandy soil, subsoil gravel, affected by grub; No. 2, sown on heavier land, subsoil white pipeclay, unaffected by grub. A pathway 12 ft. wide divides the two plots. Both plots were sown on the same date.

It is during Autumn that the grubs do most harm. They may then be found just under the surface of the soil feeding on the fibrous roots of plants. In colour they are a dirty white, with dark-brown heads. Length varies from ½ in. to ¾ in. Their harmfulness can be noticed first about February, at which time they are of small size. It is at this time that treatment should be given, as it is not too late to save the plants, and the grubs are near the surface. The best method of applying bisulphide of carbon is with the aid of an injection pump. The one in use at Ruakura is a "Vermorel." The injections can be regulated to any required depth by moving the tread. About ¼ oz. is sufficient for each injection, and one should be made every 3 ft. With this pump the time occupied to treat a lawn is of little moment, and the work is done without causing any injury to the turf. The cost of the material is therefore the main expense, but it is trifling compared with the expense of breaking up the green.

Without the pump it is necessary to make small holes about 6 in. deep, and, after pouring in the solution, to fill them up again, placing the turf in its original position. It must be remembered that bisulphide of carbon is a dangerous preparation and should be used only by careful hands. It is a transparent, colourless, inflammable liquid, emitting an extremely repulsive odour. It has great dispersive power. Its vapour is poisonous and very explosive when mixed with air; thus no light must be near when it is being used.

LOCAL conditions must be the first consideration in deciding on the crop to be grown and the variety to be used. It does not follow that because a farmer in a particular district has success with a certain crop or a certain variety that equal success will attend its cultivation in another district or even in a neighbouring locality. Type of soil, environment, aspect of the land, and prevailing climatic conditions—all have their influence and must be studied before deciding on the use to which the land is to be put.

COMMERCIAL FRUITS.

ILLUSTRATIONS OF BRANCHES OF A FEW VARIETIES.

GEORGE STRATFORD.

A MOST important matter to the fruitgrower is a knowledge of the characteristic habits of growth of the different varieties of particular families of fruit. In this article the writer has endeavoured to describe (from the view-point of growers in southern portions of the North Island) as minutely as possible several of the leading kinds of apples and pears now being grown on a commercial scale. The tree as well as the fruit has been dealt with, and a few notes on the work of cultivation have also been included.

APPLES.

Adams's Pearmain.—The branches shown are very typical of the Adams's Pearmain. It is a very free and healthy grower, producing long slender shoots, by which, and its spoon-shaped, ovate leaves, it is easily distinguished. It is a splendid bearer in most districts, and is a profitable apple to grow, keeping fairly well, and always commanding a ready sale on account of its good colour. Usually it is a very clean apple, although in some parts the tree is subject to woolly aphis. The fruit is large, pearmain-shaped, very even, and regularly formed. It ripens in the autumn, coming in soon after the Jonathan and Cox's Orange Pippin. The flesh is yellow, juicy, and rich, with a rather pleasant, strong flavour. Fruit-growers desiring a good mid-season variety cannot go wrong in planting the Adams's Pearmain, provided it be pruned well back for the first few seasons to get a good framework; otherwise it is apt to grow whippy, and the branches to break with the weight of the fruit.

Reinette du Canada.—This variety is a very vigorous grower, with a good open head, and is very productive. It is probably one of the easiest fruit-trees to prune, as it is a typical spur bearer, all the fruit being borne on short, thick spurs, close to the main branches of the tree (see photo). Practically speaking, the whole of the laterals can be cut back to form fruit spurs, leaving only the main leaders, along which sufficient fruit is carried. The Reinette du Canada is a tree which succeeds well wherever planted, and any farmer wishing for a good all-round apple could do much worse than plant this variety. The fruit is large, usually 3 in. in diameter, flat, yellowish-green, tinged on the side next to sun, and

Adams's Pearmain, No. 1.

Reinette du Canada.

Sturmer Pippin.

sprinkled with dots and russety patches. The flesh is almost white, firm, very juicy, with a sub-acid flavour. It is a good keeper, and an apple of first-class quality, either for dessert or culinary purposes.

Sturmer Pippin.—An English dessert apple that can be highly recommended. It is the most valuable late dessert apple cultivated in New Zealand. The tree is very hardy, is an excellent bearer, and without doubt is a profitable apple to grow. It responds very readily to the pruning-shears, and a Sturmer, cultivated on the vase or open-head system of pruning, with from ten to fifteen main branches, all clothed with short fruit-spurs on which the fruit is borne, may well be termed a "money-maker." The fruit is of medium size, rounded, somewhat flattened, being yellowish-green in colour, with a tinge of red on the side next the sun. The flesh is very firm, crisp, and juicy, and, when kept, has a rich, sugary flavour. It is always considered the "best on the market," is a ready seller, and a person having a few acres of Sturmers, well cultivated, cannot fail to reap good profits. The Sturmer will keep almost until apples come round again, and is one of our best export varieties.

Cox's Orange Pippin.—This apple holds first place as our best mid-season dessert variety, and, in fact, is one of the best apples in cultivation. The tree is very tender, and produces long, thin laterals which are very subject to woolly aphis. In consequence of its straggling growth, the Cox's Orange Pippin should be cut hard back during the first few years of its being placed in its permanent position in the orchard, so as to form a strong, sturdy framework for the tree. Should this be neglected, the grower will have trouble all through the life of the tree. The fruit is of medium size, being more or less round, having a skin which is greenish-yellow, streaked with red. The flesh is of a yellowish colour, tender, crisp, juicy, and sweet, with a fine perfume and rich flavour.

Alfriston.—A very healthy, vigorous-growing tree, which is very productive. It is a good spur-bearer, and all the fruit is found hanging close up to the main branches. The tree, being such a strong grower, is capable of carrying large crops of fruit. With care and attention the Alfriston should prove profitable for many years. The fruit is large and green, tinged with orange, and the flesh is firm with an acid flavour. Although not classed as a dessert variety, it is considered one of our best-quality cookers. It is a good keeper, and, like the Reinette du Canada, is a splendid farmer's apple.

Irish Peach.—The Irish Peach is one of the earliest varieties to ripen, coming in early in January. The tree is a good bearer, but the fruit will not keep. It is very subject to apple-scab. The fruit is of medium size, rather flat, coloured, and of good flavour,

Cox's Orange Pippin.

Alfriston.

Adams's Pearmain, No. 2.

Irish Peach.

Vicar of Winkfield.

ruit is of

Williams's Bon Chretien.

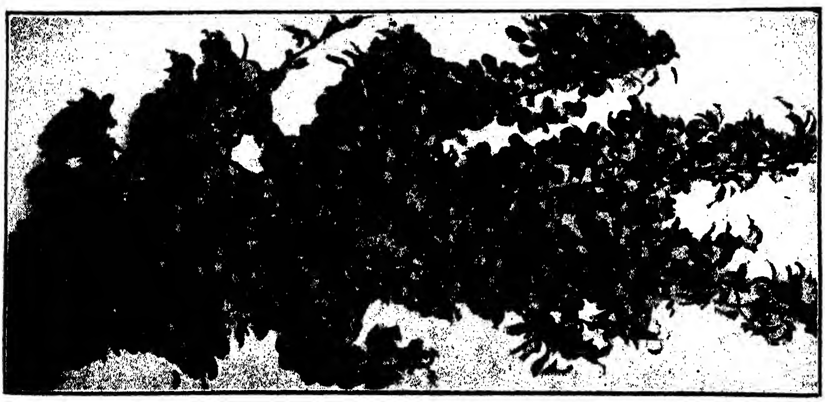
the flesh being white, tender, and crisp. The majority of the fruit is borne on the ends of the laterals, and consequently is a hard tree to put into good shape by winter pruning, although by persistent summer pruning the tree can be made to spur back, setting its fruit along the main branches, as is shown in the photograph. Coming in, as it does, so early, the Irish Peach always finds a ready market, but it is not advisable to plant many of them.

Pears.

Vicar of Winkfield.—This is a large French pear. It is a first-rate baking variety, but only second-class as dessert. The tree is a vigorous and healthy grower, the branches dropping down with the weight of the fruit. It is a profitable pear to grow, being very productive and hardy. The fruit is large, long, and pyriform, with a greenish-yellow flesh, which is very juicy. The tree is very little affected with *Fusicladium.*

Williams's Bon Chrêtien (syn. *Bartlett*).—An English pear, being the most popular of all summer varieties. The tree is a good grower, early bearer, and healthy, not much affected with black-spot. The fruit is large, pyriform, smooth, and yellow, sometimes having a delicate blush on the side next to sun. The flesh is white, fine-grained, very juicy and melting, with a highly perfumed flavour. The fruit should be picked before it becomes yellow; otherwise it decays quickly.

Beurre de Capiaumont.—This pear-tree is an upright grower, very hardy, vigorous, and a good bearer. The fruit is of medium size, and pyriform, with a pale-yellow skin, almost entirely covered with cinnamon-coloured russet. The flesh is white and delicate, with a rich sugary flavour. It is a fairly good dessert pear, although classed only second compared with other pears coming in about the same time.



Beurre de Capiaumont.

PASTEURIZATION OF SKIM-MILK.

In conjunction with the Cambridge Co-operative Dairy Company, the Department is carrying out a practical demonstration in the pasteurization of separated milk, on very similar lines to those adopted in the demonstration at Glen Oroua, where successful results were obtained two years ago.

The plant in use has been set in position by officers of the Dairy-produce Division. It is different in type from that used at Glen Oroua in that the milk is treated on what is known as the regenerative system. By this means not only is the skim-milk heated high enough to stand the Storch test, but it is delivered to the suppliers at a temperature which will be just about right for feeding purposes when it reaches the farm.

A brief description of the plant in operation is as follows: The whole milk is elevated so as to gravitate over the outside surface of a large tubular appliance (the regenerator), similar in appearance to a cooler built on the Lawrence principle. Having done so, it collects in a tray and flows to the separators. The skim-milk from the separators passes into an ordinary pasteurizer, and on emerging therefrom is forced up through the inside of the regenerator mentioned above, and from thence to the skim-milk tank. The whole milk is therefore warmed up for separating by the hot skim-milk, and simultaneously the hot milk is reduced in temperature before going out to the tank for the suppliers.

The plant has been given a trial, and found to work very successfully and with a minimum of cost.

An actual working start has been made, and everything is progressing satisfactorily. The results of the demonstrations, especially from the point of view of the efficacy of the process of pasteurizing in preventing the dissemination of tubercular infection among pigs, will be very carefully checked. An officer of the Live-stock and Meat Division, who has special knowledge of dairy-factory methods and also a good knowledge of the handling and care of stock, has been detailed to watch closely and supervise the demonstration. This close supervision will be maintained throughout the season. It is anticipated that the demonstration will serve the end in view—convince the farmers of the district of the great importance of pasteurizing skim-milk for calf- and pig-feeding purposes.

EXPERIMENTAL WORK IN THE SOUTH ISLAND.

A. Macpherson.

Co-operative Field Experiments.

Greatly increased interest and most gratifying support must be recorded in connection with the co-operative field experimental campaign in the South Island in the official year 1912–13. That the great educational value of the experiments, especially from the locality point of view, is being more generally appreciated is proved by the great increase in correspondence which took place during the year, inquiries being received in regard to the experiments from a large number of farmers in the respective districts. Experiments were conducted on 230 farms, the total number of experimental plots being 3,712.

Prominent Fodder Crops.—Among the plants experimented with, lucerne and silver-beet stand out as deserving of more than special mention. There can be no doubt that the lucerne tests initiated under the direction of Mr. E. Clifton, Director of the Fields and Experimental Farms Division, and so readily taken advantage of by farmers during the past year, will have a far-reaching effect in the future economy of farming in this country. The incalculable benefit which will be derived in future years from the growing of this forage plant cannot at present be estimated. The introduction of silver-beet (hitherto a "garden vegetable") as a fodder for stock has so far proved that it is likely in the near future to be recognized as one of the foremost fodder plants for all classes of farm animals. In order to test the capability of this plant on different soils and under different climatic conditions, and on account of the advisability of further testing its feeding and carrying capacity, experimental areas were secured in districts throughout the Island as far apart as possible. To make the test complete the size of the experimental areas was increased in some cases to 1 acre. This will allow of the acre being divided into four parts for feeding-off purposes, so that the feeding-qualities of the plant can be the better determined. Sowings were made in both spring and autumn.

Following are the most important crops experimented with by co-operating farmers: Lucerne (for the testing of which the Depart-

ment supplied seed for 1 acre, and lime and inoculated soil for ½ acre, free of charge) was tried on 143 farms, under a great variety of soil and climatic conditions. Variety tests were conducted on 8 farms. Silver-beet was tested over an equally wide area of country, experiments being carried out on 24 farms, with 35 manurial plots and 20 variety and other tests plots. Other fodder crops tested were—Maize (67 plots on 9 farms), millet (3 plots on 3 farms), helianthi (6 plots on 6 farms), kohl-rabi (2 plots on 2 farms), oats and tares (1 plot), thousand-headed kale (3 plots on 3 farms), rape, broad-leaved (10 plots on 4 farms), green Buda kale (15 plots on 15 farms), chou moellier (28 plots on 27 farms), Wilson's white cattle-cabbage (1 plot), Garton's marrow-stem kale (7 plots on 7 farms).

Root Crops.—Varieties of root crops were well tested. Mangels were tested from variety and manurial points of view in 542 plots on 19 farms. Swedes were tested in 767 variety and manurial plots on 32 farms; yellow- and white-fleshed turnips in 812 plots on 28 farms; carrots in 119 plots on 12 farms; parsnips in 10 plots on 5 farms; sugar-beet, 1 plot. Experiments were also conducted with peas, 55 plots on 4 farms; Soya beans, 1 plot; horse-beans, 1 plot. Sixteen farmers conducted potato trials, which included 78 manurial tests, 91 spraying tests, and 15 variety tests. Pumpkins were tested in 6 plots on 2 farms; marrows in 6 plots on 2 farms; squashes, 2 plots on 2 farms; lupins, 2 plots on 2 farms; grasses and clovers, 17 plots on 6 farms.

Grains.—In the grain experiments the sowings had to be done in the spring, owing to the weather-conditions being unfavourable throughout the winter. There were 168 tests, manurial and variety, on 9 farms in connection with wheat; 181 on 13 farms in connection with oats; 2 on 2 farms in connection with barley.

HIGH SCHOOL CO-OPERATION.

Again a number of high schools co-operated in an altogether admirable manner with the Department in the conduct of experimental plots, the value of which work was very far-reaching, by reason of the greater prominence given to it than in the case of the individual farmer's experiments. A very large community of farmers no doubt profited by the carefully conducted experiments at many of the district high schools. The experiments covered a wide range of subjects. The schools co-operating were: Waitaki Boys' High School, Oamaru, 251 plots; Boys' High School, Rangiora, 251 plots; Ashburton District High School, 209; District High School, Tapanui, 205; District High School, Tokomairiro, 129;

CHOU MOELLIER IN THE CO-OPERATIVE EXPERIMENTAL AREA AT THE CANTERBURY FROZEN-MEAT COMPANY'S WORKS AT BELFAST, AFTER THE LEAVES HAD BEEN EATEN OFF BY SHEEP.

The stalks shown in the picture were carted off for feeding to pigs.

District High School, Palmerston South,. 98; District High School, Mosgiel, 92; District High School, Balclutha, 59; District High School, Alexandra, 4—all in all, 1,298 plots.

GENERAL EXPERIMENTAL WORK.

Apart from the co-operative experiments, a considerable amount of revegetation experimental work, designed to discover means of elucidating special local problems, are under progress in this Island. In the work of revegetating depleted country on the Mackenzie Plains and in Central Otago there are 408 plots of grasses, clovers, and deep-rooted plants.

Since the initiation of these experiments three years ago five sowings have been made at Sawdon, Haldon, and Earnscleugh; at Whalesback, where an experimental area was laid off a year ago, two sowings were made. In the Mackenzie country spring sowings have done better, while in Central Otago autumn sowings have done better. The experiments so far go to show that surface sowing of these lands would be a waste of money; that surface sowing and harrowing would give results very little better, and that even cultivating the land with a cultivator, harrowing, rolling, sowing the seed broadcast, and harrowing afterwards does not give nearly as good results as when the seed with the same cultivation and work is drilled in. The grasses, clovers, and deep-rooted plants which have given the best results so far are tall oat-grass, awnless brome-grass, cocksfoot, prairie-grass, *Agropyron repens*, *Phalaris commutata* *Festuca dumetorum*, rib-grass, Bokhara clover, white clover, underground clover, lucerne, sheep's burnet, chicory, sainfoin, and yarrow.

Regrassing-work on Morven Hills.—The experimental area at Morven Hills, Run J238, was taken over during the year. A portion, about 150 acres, was fenced in with a rabbit-proof fence, and 130 acres of the area was ploughed and cultivated and dealt with as follows: Sown with grasses, &c. (two sowings, autumn and spring), 80 plots, 37 acres; sown with rape to be ploughed in for green-manuring, 72 acres; sown with white mustard to be ploughed in for green-manuring, 6 acres; sown with oats for chaffing 15 acres: total, 130 acres.

Reclamation of Sand Areas.—The successful demonstrations carried out the previous year to show that these vast areas should no longer remain unproductive and were capable of being brought to produce payable crops were further extended, four areas being dealt with in Canterbury and one in Otago. A large number of letters were received from settlers in different localities asking for

advice in regard to such areas. When time admitted the localities were visited and advice given. When this could not be done advice was given by letter.

Experimental Areas, West Coast.—Roto Manu: 5 acres, part of Reserve IX, Te Kinga S.D., swamp land, was drained, ploughed, limed, and fenced in, preparatory to comprehensive experiments being initiated next spring. Poerua: 1 acre, part of Reserve 26, Block XIV, Te Kinga S.D., bush land, was cleared, ploughed, and fenced, preparatory to a complete scheme of experiments being carried out next season. Moana: 5 acres of bush, part of Section 2891, Block V, Brunner S.D., bush land, was felled and burnt, to be sown this autumn with various grasses. Pakihis, Westport: 1 acre, Buller Recreation Reserve, pakihi formation, was drained with explosives, the timber removed, ploughed, limed, and fenced in, and made ready for experiments to be initiated next spring. 4 acres on the south side of the Buller River was ploughed, and is to be limed, preparatory to experiments being carried out thereon.

Manuka Scrub Lands between the Eyre and Waimakariri Rivers.—Five acres, typical of 70,000 acres of similar scrub land in the locality, was scrubbed, ploughed, and enclosed with rabbit-proof fence by the farmers in the district. This area has been handed to the Department for from five to seven years, to conduct experiments to find out if the land can be brought into profitable use. The farmers undertake the labour and the Department controls the experiments and provides the seeds, lime, &c., necessary for the experiments.

White Lodino Clover.—One of the most promising introductions from abroad at the Ruakura Farm of Instruction is White Lodino clover, received last year from Mr. J. S. Pond, of Auckland. This variety was raised by the Lodino Plant-breeding Association, of France, and is being distributed by Messrs. Villmorin and Co., of Paris. It is a perennial white clover, possessing the same habits as ordinary white clover, but of a larger type having bigger leaves and stonger stolons, and producing considerably more feed. In a comparative test with white clover it stands out most prominently.

THE soil provides the plant not only with certain plant-foods, but also with water and air; and the extent and nature of these supplies goes more to determine the crop than anything else. Therefore, although manuring is often necessary, it is of vital importance that the soil should be well cultivated and properly managed.

EDAM CHEESE.

Miss G. N. Davies, N.D.D.

Edam is a round Dutch cheese made in Holland. It is usually coloured either dark red or bright yellow, measures about 6 in. in diameter, and weighs about 4 lb. The texture is perfectly solid, and the cheese rather hard, the best quality being something like Cheddar. This cheese is made chiefly in North Holland, and is placed on the market in large quantities from the Town of Edam, which is on the Zuyder Zee, about twelve miles north-east of Amsterdam. Edam cheese is usually made out of partly skimmed milk, and *lange wei* (slimy whey) is used as starter.

Method of Manufacture in England.

To produce four cheeses: 18 gallons of milk, 6 drams of rennet, 6 drams of annatto, 1 quart of starter. Setting temperature, 86° F. Temperature of room, 70° F. Acid test, 0·21 per cent.

The milk is regulated to a temperature of 86° F., and the colouring-matter and starter added. These should be well stirred in for ten minutes; then rennet added at the rate of 1 dram to 3 gallons of milk, but before mixing with the milk it should be diluted with at least three times its volume of water. The period of coagulation is usually about thirty minutes, but the curd should be cut as soon as it is firm enough. In cutting, the Cheddar knives are used. The curd is then stirred for twenty minutes, after which scalding is commenced. The temperature of the whole is raised very gradually to 95° F., the curd being stirred the while. As soon as firm enough it should be allowed to pitch for fifteen minutes.

The whey may now be run off. This is done in three parts, the process taking forty minutes, and in an hour and a half from the time of cutting the whey is finally drawn. After being left to drain for ten minutes the curd is vatted into four moulds. Leave in the moulds for fifteen minutes; then bandage or place in a cloth and place back into the moulds, and when firm enough put under pressure. The first pressure should be 1 cwt., increasing to 3 cwt. in eight hours' time. The cheeses are then taken out, the

cloths changed, and edges pared. They are then replaced in press, and next morning are taken out, pared, and salted.

Edam cheeses made in England have the tendency to go dry, and very few are manufactured there.

Method of Manufacture in Holland.

The evening's milk is partly skimmed; then mixed with the morning's milk and regulated to a temperature of 80° F. Slime (*lange wei*), which is slimy whey, is added at the rate of 3 litres to 42 gallons of milk, and annatto 3¼ drams to the same quantity of milk. The milk is then stirred for ten minutes before the rennet is added. Rennet at the rate of 2½ oz. to 42 gallons of milk, and leave to coagulate for thirty minutes, after which it should be ready for cutting.

After cutting, remove any curd adhering to the sides and bottom of the vat; then stir with the utmost care, as the curd is very tender. After stirring for thirty minutes the bulk is heated to 86° F. Stirring is then continued until the curd is somewhat firmer than a Leicester curd, a condition which is obtained in about one hour and a half from the commencement of stirring. The curd is then left to "pitch" or settle in the whey, and when settled the whey is run off. As soon as the curd has drained enough it is filled into the moulds and left for an hour, covered over. The cheese is then turned over, end for end, in the mould, and left for another hour. Afterwards cover the cheese neatly with fine calico, and place in the press for two hours.

The cheese is then taken from the press and immersed in strong brine, enough being used to wet all the surface of the cheese thoroughly. Then rub over with salt (rather coarse salt being used). Salting is done twice a day, but the cheeses are dipped in brine only once. Continue salting for three days, and on the fourth day the cheeses are removed to the ripening-room and placed on the shelves. They are turned every morning for about six weeks, after which they are ready to go to market. When the cheeses are about eight days old they are put in water to soak for three-quarters of an hour. They are then washed with a cloth, wiped, and put back upon the shelves.

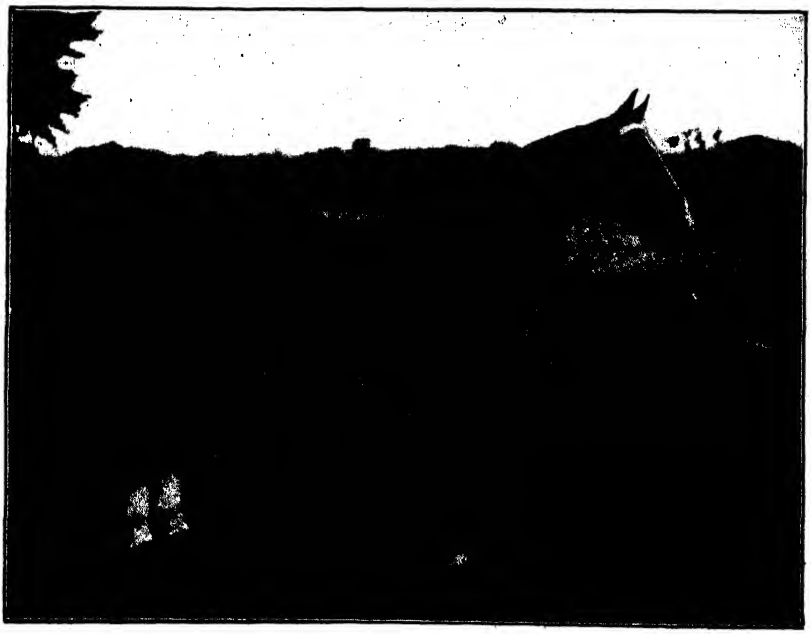
Four or five days before sending to market they are again soaked in clean water for about one hour and a half, and then lifted from this bath into another which is prepared by mixing 3 quarts lime with 25 gallons water. The cheeses are soaked in this solution for seven to ten minutes; then scrubbed with a brush.

This is done for two to four days. They are then dried, and either rubbed over with a little oil or painted with cochineal.

In Holland cheeses for export are scraped with a sharp knife or special machine before being sent away, so that they have as smooth a surface as possible. They are then coloured according to their destination. When not sent far they are either not coloured at all when put on the market, or are coloured with colcothar. Cheeses with red rinds are known as "red crusts." When coloured yellow the colour is imparted by the use of a solution of annatto and linseed-oil.

Edam cheeses made out of Holland do not seem to prove a success, as they get hard, probably because there is no *lange wei* used.

Milk very rich in fat is not suitable for this cheese. Too damp an atmosphere or, still more, dry cold winds are very hurtful to the cheese when in the curing-room. In Holland Edam cheeses which have gone bad are pounded into barrels, and the mass is sold as pottkaas.



A POLO-PONY STALLION.

The first specimen of the breed introduced to the Dominion. Imported by the Home breeder, Mr. W. A. Pillers.

WATER-SUPPLY FOR GROWING PLANTS:

ITS IMPORTANCE IN TOMATO-CULTURE UNDER GLASS.

S. F. Anderson.

The question of moisture in plant-production is of vital importance. It is well known that to keep a plant in health there must be a continuous and regular supply of moisture to the roots. This is drawn up and evaporated, or perspired, through the leaves. It is this process of transpiration that keeps a plant cool in the hottest weather. It is so rapid that, according to J. D. Hooker, "a sunflower-plant has been found to give off a quart of fluid in twenty-four hours." In a tomato-plant, every part of which is green and soft, this transpiration takes place from every part of the stem as well as through the leaves. To prove that this is the case one has only to notice those plants which have had their leaves almost entirely taken away to ripen their fruit (wrongfully, of course) to understand that in their case the transpiration must be very great, even through the green stems.

It has to be realized by the grower of any plant, particularly plants being raised under glass, that where the conditions depend to a great extent on their being maintained artificially, the soil medium must be such that the supply of moisture, air, and temperature to the roots can be regulated. To state that good drainage is one of the chief means to attain this condition of moisture in the soil may appear, to any one unacquainted with the principles of plant-growth, contradictory. It is, however, really the case that the providing of a means of taking away surplus water regulates a better supply of moisture to the roots of plants. By affording good drainage and cultivation the soil is then in much the same condition as a sponge, which draws up to itself from below just that supply of moisture necessary, admits air from the surface, and maintains a temperature suitable to plant-growth. In representing the soil as a sponge it can also be understood more readily how the root-hairs, with their spongioles, can push their way through the interstices in every direction, and draw the moisture and air required for their growth.

Let it be noted now how necessary it is to prepare the soil beforehand by trenching and draining in order to obtain these

conditions. When the surface is regularly cultivated—just lightly hoed — the moisture is maintained about the roots, and much watering of the surface is thus avoided. When watering is done it should be by moving the rose over the surface several times rather than giving one heavy application, so as to avoid consolidating the ground. It is obvious that where a stream of water out of a hose is left running for hours very considerable consolidation of the soil must occur. This method of applying water is too often practised, with a frequently disastrous result to the plants, because the interstices or minute cavities become closed. This prevents the entrance of air and the free growth of roots, and lowers the temperature of the soil.

A short time ago the writer met with a case that will serve as an illustration of bad and good culture. A tomato-house (90 ft. by 27 ft.) was situated on a gentle slope. The soil was a good loam of some 6 in. to 8 in. deep, with a retentive clay subsoil. It was drained around the outside, but, owing to the cold, impervious nature of the subsoil, this proved insufficient to get good results. After growing tomatoes in it for a few years the owner gave it up, the yield of fruit scarcely paying expenses. The house passed into the hands of another man, who on obtaining possession at once proceeded to trench the whole house. In the bottom of the trench he placed a layer of broken bricks, grading the trench with a slight fall to the side drains. On the top of the bricks he replaced the soil, well mixed together and with other good soil added, to a depth of 18 in. to 20 in. The result was that he cleared £85 from his first year's crop. The second crop is now well advanced, and is an object-lesson of good work, even growth, and healthy condition. He says that the yield for this year will more than double the yield of last season. It may be added that he used very little water.

STACK SILAGE.

THE Department is now prepared to consider applications from farmers for expert advice regarding the stack system of making silage. The services of an expert are available, and arrangements can be made with the Director of the Fields and Experimental Farms Division, Wellington, for him to visit a limited number of applicants and supervise the making of silage on their properties. No charge will be made for this service.

Two vital essentials in co-operative effort: capable officers; loyalty of co-operating farmers. No co-operative society can succeed under poor management or where there is disloyalty on the part of its members.

CHEESE.

EXAMINATIONS FOR THE CONTENT OF MOISTURE AND BUTTER-FAT.

W. E. Gwillim.

The work of ascertaining the moisture and fat content of cheese, representative of all descriptions of make exported during the past dairy season, which was commenced on the 17th October, 1912, was concluded on the 28th May, 1913.

In all, 386 samples of cheese of the brands of 127 different factories were examined, and the average content was—Moisture, 36·02 per cent.; fat, 34·29 per cent.; casein and other solids, 29·69 per cent.

In lists A and B of well-made cheese, the total number of samples was 327. The following total is a summary of results grouped according to the port where the cheeses were graded:—

Grading-port.	Number of Samples.	Moisture.	Fat.	Casein and other Solids.	Age: Days old.	Points for Body and Texture.
		Per Cent.	Per Cent.	Per Cent.		
Wellington	239	36·05	34·37	29·58	21·5	28·5
Bluff	29	36·03	34·04	29·93	25·0	28·7
Dunedin	2	36·30	33·40	30·30	..	..
Lyttelton	7	35·23	33·85	30·92	30·6	28·2
Patea	24	36·46	34·10	29·44	30·9	28·2
New Plymouth ..	24	35·89	33·93	30·18	25·9	28·3
Auckland	2	33·30	37·60	29·10	40·5	28·0
Average ..	327	36·01	34·29	29·70	23·6	28·5

List C consisted of fifty-nine samples of cheese of indifferent make, and the following table is a summary of the results grouped

according to the chief characteristics of the defects in the body and texture:—

Description of Make.	Number of Samples.	Moisture.	Fat.	Casein and other Solids.	Age: Days old.	Points for Body and Texture.
		Per Cent.	Per Cent.	Per Cent.		
Stiff	3	33·53	35·47	31·00	30·0	27·2
Too firm	5	33·30	34·32	32·38	24·0	27·0
Dry, mealy	4	34·65	33·10	32·25	17·7	27·0
Harsh, mealy, generally green	7	35·30	33·95	30·75	15·0	26·9
Sweet, sweet holes ..	7	35·77	34·11	30·12	19·0	26·9
Acid cut, acidy, dry ..	6	35·62	34·50	29·88	24·0	26·2
Acid cut, acidy, weak, soft	8	37·47	33·90	28·63	21·6	26·2
Pasty, pasty and loose	7	37·68	34·46	27·86	21·0	27·0
Weak, weak and loose ..	12	37·33	34·12	28·55	17·2	26·8
Average ..	59	36·08	34·33	29·59	17·7	26·7

In the two previous reports comment was made on the percentage of samples within a range of 3 per cent. in both moisture and fat content. With the season's work completed, a range of 4 per cent., which is 2 per cent. above and below the average, gives a better illustration of the uniformity of those contents thus:—

In list A the average moisture-content was 36·1 per cent., highest 39 per cent., lowest 32·8 per cent., and 87 per cent. of the samples contained moisture between 34·1 per cent. and 38 per cent.; the average fat-content was 34·41 per cent., highest 37·6 per cent., lowest 29·6 per cent., and 80 per cent. of the samples contained fat between 32·1 per cent. and 36 per cent.

In list B the average moisture-content was 35·92 per cent., highest 38·8 per cent., lowest 33 per cent., and 92 per cent. of the samples contained moisture between 34·1 per cent. and 38 per cent.; the average fat-content was 34·17 per cent., highest 38·4 per cent., lowest 30·4 per cent., and 85 per cent. of the samples contained fat between 32·1 per cent. and 36 per cent.

In list C the average moisture-content was 36·08 per cent., the highest 39·6 per cent., lowest 32·3 per cent., and 75 per cent. of the samples contained moisture between 34·1 per cent. and 38 per cent.; the average fat-content was 34·33 per cent., highest 38 per cent., lowest 30·8 per cent., and 78 per cent. of the samples contained fat between 32·1 per cent. and 36 per cent.

Some of the widest variations in composition of the best-made cheese in lists A and B were as follows:—

No. for Factory Brand.	Moisture.	Fat.	Casein and other Solids.	Age: Days old.
	Per Cent.	Per Cent.	Per Cent.	
7	38·6	31·2	30·2	24
9	37·4	32·4	30·2	28
4	37·1	35·2	27·7	..
85	36·0	36·0	28·0	25
7	36·0	35·2	28·8	31
9	35·8	33·6	30·6	25
4	34·8	37·6	27·6	21
76	33·6	36·8	29·6	20

The body and texture of these cheese were practically perfect.

The particulars following form the third and last part of each list in which the results of the examinations were tabulated.

List A, Part III.

Following are particulars of forty-eight samples of cheese examined for content of moisture and fat, ex lots from ten factories in the Wairarapa and Forty-mile Bush districts exported by the five fortnightly steamers "Ruahine," "Tainui," "Rotorua," "Ionic," and "Ruapehu," which sailed 3rd April to 28th May, 1913, inclusive. One sample from each brand each fortnight. Body and texture about normal for acid. Maximum grading score obtainable for body and texture, 30 points.

No. for Factory Brand.	Moisture.	Fat.	Casein and other Solids.	Age, and Notes at Sampling.		
				Days old.	Body and Texture.	
					Points for.	Remarks on.
	Per Cent.	Per Cent.	Per Cent.			
1	34·5	36·0	29·5	26	28	On sweet side.
	35·2	36·0	28·8	30	28	..
	34·7	36·0	29·3	19	28	On weak side.
	34·4	36·0	29·6	14	28	On green side.
	..	..	..	..	..	None shipped.
Average ..	34·70	36·00	29·30	22·5	28	
2	36·0	34·4	29·6	26	28	On sweet side.
	36·0	35·2	28·8	23	28½	..
	35·9	35·2	28·9	20	29½	Good.
	35·8	34·4	29·8	25	29	..
	37·2	34·8	28·0	18	28½	..
Average ..	36·18	34·80	29·02	22·4	28·7	

No. for Factory Brand.	Moisture.	Fat.	Casein and other Solids.	Age, and Notes at Sampling.		
				Days old.	Body and Texture.	
					Points for.	Remarks on.
	Per Cent.	Per Cent.	Per Cent.			
3	35·3	35·6	29·1	25	28½	..
	36·5	36·0	27·5	24	28½	..
	37·1	36·0	26·9	23	29	..
	36·4	36·8	26·8	27	28	Little acidy.
	37·8	34·8	27·4	25	28	Little weak.
Average ..	36·62	35·84	27·54	24·4	28·4	
4	34·7	36·4	28·9	16	29	..
	33·4	35·6	31·0	22	29	..
	34·4	36·4	29·2	21	29½	Good.
	34·8	37·6	27·6	21	29½	,,
	36·2	36·8	27·0	21	29	..
Average ..	34·70	36·56	28·74	20·2	29·2	
5	37·4	32·0	30·6	10	28	Green.
	36·4	32·8	30·8	14	28	..
	36·8	34·0	29·2	14	28	On green side.
	38·8	31·6	29·6	14	28	,,
	39·0	30·4	30·6	14	28	Green.
Average ..	37·68	32·16	30·16	13·2	28	
6	34·8	35·2	30·0	30	29	..
	35·3	36·0	28·7	25	29½	Good.
	34·9	36·0	29·1	29	28½	..
	36·5	35·2	28·3	30	29	..
	35·8	35·2	29·0	26	29½	Good.
Average ..	35·46	35·52	29·02	28	29·1	
7	36·2	35·2	28·6	19	28½	..
	35·8	36·0	28·2	23	28½	..
	36·2	36·8	27·0	22	28½	..
	36·0	35·2	28·8	31	29½	Good.
	36·8	36·4	26·8	24	28½	..
Average ..	36·20	35·92	27·88	23·8	28·7	
8	35·9	35·2	28·9	19	28	..
	34·5	36·0	29·5	21	28	..
	36·2	36·0	27·8	10	28	Green.
	36·0	34·4	29·6	21	28½	..
	..	..	..	..	..	None shipped.
Average ..	35·65	35·40	28·95	17·7	28·1	
9	34·9	36·4	28·7	25	29	Tender.
	34·9	36·4	28·7	24	28½	..
	35·9	37·2	26·9	18	28½	..
	36·8	36·4	26·8	30	29	..
	37·2	36·0	26·8	21	28½	..
Average ..	35·94	36·48	27·58	23·6	28·7	

No. for Factory Brand.	Moisture.	Fat.	Casein and other Solids.	Age, and Notes at Sampling.		
				Days old.	Body and Texture.	
					Points for.	Remarks on.
	Per Cent.	Per Cent.	Per Cent.			
10	35·6	35·2	29·2	26	28	..
	35·4	35·2	29·4	11	28	On green side.
	36·8	34·8	28·4	14	28	Green.
	35·1	36·0	28·9	20	28	..
	37·6	33·6	28·8	21	29	..
Average ..	36·10	34·96	28·94	18·4	28·2	

General Average of the Forty-eight Samples examined in this List.

Moisture.	Fat.	Casein and other Solids.	Age: Days old.	Points.
Per Cent.	Per Cent.	Per Cent.		
35·92	35·37	28·71	21·42	28·51

Summary of Average Percentages of the Ten Factories in this List, from 17th October, 1912, to 28th May, 1913.

No. for Factory Brand.	Moisture.	Fat.	Casein and other Solids.	Age: Days old.	Points.	Number of Samples.
	Per Cent.	Per Cent.	Per Cent.			
1	35·96	34·23	29·81	19·25	28·05	16
2	36·57	34·26	29·17	21·69	28·45	17
3	36·25	34·59	29·16	22·54	28·63	17
4	34·98	35·08	29·94	19·38	29·00	17
5	37·38	32·66	29·96	14·77	28·00	17
6	36·03	34·14	29·83	24·54	28·77	17
7	36·33	34·59	29·08	23·84	28·73	17
8	35·95	34·71	29·34	21·27	28·17	15
9	35·94	35·04	29·02	25·77	28·77	17
10	35·59	34·81	29·06	20·92	28·36	17
General average	36·10	34·41	29·49	21·50	28·50	167

Summary of Average Percentages of the Ten Brands shipped by each Fortnightly Steamer, which sailed 3rd April to 28th May, 1913, inclusive.

Steamer.	Moisture.	Fat.	Casein and other Solids.	Age: Days old.	Points.	Sailing-date.
	Per Cent.	Per Cent.	Per Cent.			1913.
Ruapehu	37·20	34·75	28·05	21·1	28·7	28 May.
Ionic	36·06	35·36	28·58	23·3	28·6	15 ,,
Rotorua	35·89	35·84	28·27	19·0	28·5	30 April.
Tainui	35·34	35·52	29·14	21·7	28·4	17 ,,
Ruahine	35·34	35·52	29·14	21·7	28·4	3 May.
Average ..	35·92	35·37	28·71	21·42	28·51	

List B, Part III.

Following are particulars of nineteen samples of cheese examined for content of moisture and fat, ex lots of nineteen factories graded at grading-ports as stated, and shipped by various Home-going steamers, which sailed from 3rd April to 28th May, 1913, inclusive. Body and texture about normal for acid. Maximum grading score obtainable for body and texture, 30 points.

Tested to.	Graded at	No. for Brand.	Moisture.	Fat.	Casein and other Solids.	Age, and Notes at Sampling. Days old.	Body and Texture. Points.	Body and Texture. Remarks.
			Per Cent.	Per Cent.	Per Cent.			
17.4.13	Wellington ..	67	35·3	36·8	27·9	23	28	..
	New Plymouth	107	34·9	36·0	29·1	25	28½	..
	,,	123	36·1	36·8	27·1	20	28½	..
	,,	84	35·8	37·2	27·0	28	28	Little acidy.
	,,	83	34·6	35·6	29·8	24	28½	..
	,,	85	36·1	34·8	29·1	19	28½	..
	,,	102	36·7	34·8	28·5	32	28½	..
	,,	86	34·8	34·8	30·4	21	28	..
	Patea ..	61	35·0	36·0	29·0	28	28½	..
	,, ..	117	34·5	36·4	29·1	34	28	..
	Auckland ..	126	33·0	38·4	28·6	42	28	..
	,, ..	127	33·6	36·8	29·6	45	28	..
	Bluff ..	17	34·8	36·4	28·8	25	29	..
	,, ..	124	34·7	36·0	29·3	25	28½	..
30.4.13	Lyttelton ..	110	35·0	37·6	27·4	35	28½	..
	Wellington ..	68	36·6	36·8	26·6	22	28½	..
	,, ..	15	35·8	38·0	26·2	23	28	Little weak.
15.5.13	,, ..	11	36·0	36·0	28·0	19	28½	..
	,, ..	50	35·5	36·4	28·1	19	28½	..
	Average ..	..	35·20	36·40	28·40	26·9	28·34	

Summary of Averages.

Graded at	Number of Samples.	Moisture.	Fat.	Casein and other Solids.	Days old.	Points.
		Per Cent.	Per Cent.	Per Cent.		
Wellington	5	35·84	36·80	27·36	21·2	28·3
Patea	2	34·75	36·20	29·05	31·0	28·2
New Plymouth ..	7	35·71	35·57	28·72	27·1	28·3
Auckland ..	2	33·30	37·60	29·10	40·5	28·0
Lyttelton ..	1	35·00	37·60	27·40	35·0	28·5
Bluff	2	34·75	36·20	29·05	25·0	28·7
Average ..	19	35·20	36·40	28·40	26·9	28·34

General Average of the 160 Samples examined in this List.

Number of Samples.	Moisture.	Fat.	Casein and other Solids.	Days old.	Points.
	Per Cent.	Per Cent.	Per Cent.		
160	35·92	34·17	29·91	25·9	28·4

LIST C, PART III.

Following are particulars of ten samples of cheese examined for content of moisture and fat, ex lots of seven factories graded at grading-ports as stated, and shipped by various Home-going steamers, which sailed from 3rd April to 28th May, 1913, inclusive. Cheese scoring 27 points and over are first grade for body and texture; below 27 points are second grade.

Tested to	Graded at	No. for Factory Brand.	Moisture.	Fat.	Casein and other Solids.	Age, and Notes at Sampling. Days old.	Body and Texture. Points.	Body and Texture. Remarks.
			Per Cent.	Per Cent.	Per Cent.			
17.4.13	Bluff ..	29	33·0	36·0	31·0	25	27	Stiff, harsh, salty.
	Wellington	94	36·9	36·0	27·1	7	26½	Green; weak.
	,,	125	35·3	36·8	27·9	14	26	Soft; sticky.
30.4.13	,,	125	36·6	38·0	25·4	20	26	,, ,,
	,,	94	37·4	34·8	27·8	6	26½	Green; weak.
	,,	115	35·6	36·0	28·4	12	27	Green; little weak.
15.5.13	,,	75	38·2	35·2	26·6	19	27	Pasty.
28.5.13	,,	54	36·2	36·4	27·4	23	27½	Little pasty.
	,,	75	39·4	34·4	26·2	21	26½	Pasty; soft.
	,,	3	39·6	36·0	24·4	12	26½	Green; weak; acidy.
	Average	..	36·82	35·96	27·22	15·9	26·7	

General Average of the Fifty-nine Samples examined in this List.

Number of Samples.	Moisture.	Fat.	Casein and other Solids.	Days old.	Points.	First Grade.	Second Grade.
	Per Cent.	Per Cent.	Per Cent.			Per Cent.	Per Cent.
59	36·08	34·33	29·59	17·7	26·7	63	37

SUMMARY OF PERCENTAGES: LIST A, PART III.

Moisture-content.

Highest.		Lowest.		Average.
39·0	..	33·4	..	35·92

Range.		Number of Samples.		Per Cent.
33·1 to 34	..	1	..	2·08
34·1 to 35	..	11	..	22·92
35·1 to 36	..	16	..	33·33
36·1 to 37	..	12	..	25·00
37·1 to 38	..	6	..	12·50
38·1 to 39	..	2	..	4·17
		48		100·00

Fat-content.

Highest.		Lowest.		Average.
37·6	..	30·4	..	35·37

Range.		Number of Samples.		Per Cent.
30·1 to 31	..	1	..	2·08
31·1 to 32	..	2	..	4·17
32·1 to 33	..	1	..	2·08
33·1 to 34	..	2	..	4·17
34·1 to 35	..	6	..	12·50
35·1 to 36	..	24	..	50·00
36·1 to 37	..	10	..	20·83
37·1 to 38	..	2	..	4·17
		48		100·00

SUMMARY OF PERCENTAGES: LIST B, PART III.

Moisture-content.

Highest.		Lowest.		Average.
36·7	..	33·0	..	35·20

Range.		Number of Samples.		Per Cent.
32·1 to 33	..	1	..	5·26
33·1 to 34	..	1	..	5·26
34·1 to 35	..	8	..	42·11
35·1 to 36	..	5	..	26·32
36·1 to 37	..	4	..	21·05
		19		100·00

Fat-content.

Highest.		Lowest.		Average.
38·4	..	34·8	..	36·40

Range.		Number of Samples.		Per Cent.
34·1 to 35	..	3	..	15·79
35·1 to 36	...	5	..	26·32
36·1 to 37	..	7	..	36·84
37·1 to 38	..	3	..	15·79
38·1 to 39	..	1	..	5·26
		19		100·00

Summary of Percentages: List C, Part III.

Moisture-content.

Highest.		Lowest.		Average.
39·6	..	33·0	..	36·82

Range.		Number of Samples.		Per Cent.
32·1 to 33	..	1	..	10·0
35·1 to 36	..	2	..	20·0
36·1 to 37	..	3	..	30·0
37·1 to 38	..	1	..	10·0
38·1 to 39	..	1	..	10·0
Over 39	..	2	..	20·0
		10		100·0

Fat-content.

Highest.		Lowest.		Average.
38·0	..	34·8	..	35·96

Range.		Number of Samples.		Per Cent.
34·1 to 35	..	2	..	20·0
35·1 to 36	..	5	..	50·0
36·1 to 37	..	2	..	20·0
Over 37	..	1	..	10·0
		10		100·0

Milk from healthy cows, milked by clean attendants into sanitary utensils, cooled and kept cool, is the basis of all good dairy-products.—*Butter, Cheese, and Egg Journal.*

Improving the Milk-supply.—I am pleased to say that we have entered into a written agreement that no dairy factory along this coast will accept milk from, or allot shares to, any would-be supplier who has commenced the season by delivering milk to another factory, except in the case of a change of residence rendering it necessary. This should strengthen the hands of the managers in refusing inferior milk, and thereby tend to improve our output.—*James Burgess, Warea, Taranaki.*

TOMATO - CULTURE.

LOWER HUTT EXPERIMENTS.

T. C. WEBB, JUN.

IN connection with the experiments carried out by the Orchards, Gardens, and Apiaries Division of the Department to demonstrate the possibilities of certain methods in the prevention of diseases attacking the tomato-plant, several tests were made with tomatoes grown in the open. As in the case of experiments with house-grown tomatoes, already reported upon in the July issue of the *Journal,* manurial treatment, as well as the application of fungicides and insecticides, was tested. The results, generally, were decidedly encouraging, but unfortunately, owing to unusually early and very severe frosts, the experimental work was interferred with to a serious extent.

A further series of experiments has been planned for this season. The outdoor experiments were conducted on land obtained for the purpose from Mr. J. Brasell, Waterloo Road, Lower Hutt. The land was divided into three plots. Following are the results:—

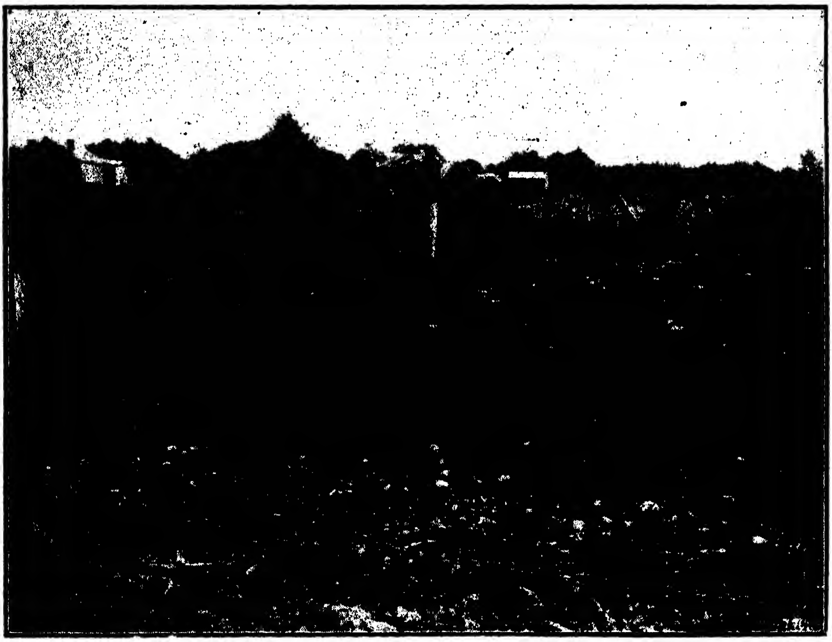
PLOT NO. 1.

This plot, which was set out before the Department commenced the experiments, had received, before planting, 8 cwt. of Gear garden manure. The drills were opened with a banker, manured, and filled in with a scarifier. This was the only dressing of manure the plot received. All sturdy plants were used, being raised in a hotbed and pricked out into a cooling-frame. The plants, after being set in the frames, were sprayed with Burgundy mixture—4 lb. sulphate of copper, 5 lb. washing-soda, to 50 gallons of water.

On 20th December, 1912, the plot was planted. It consisted of fifteen rows. Spraying with Bordeaux mixture—4-4-40—was commenced soon after planting. Fifteen rows, belonging to Mr. Brasell and planted one week before Plot No. 1, were used for comparative tests as to the results of a portion of the experiments. Mr. Brasell's plot received at the rate of 8 cwt. Gear garden

manure* per acre before planting and 8 cwt. Gear garden manure top-dressed after planting. Also, on the first signs of fruit, the plot received an extra 8 cwt. per acre of the same manure.

Mr. Brasell's plot coloured and ripened quicker than Plot No. 1, and the yield, approximately speaking, would be one hundred cases more, the weight of a case being 24 lb. net. With the extra 16 cwt. of manure, it would seem that it did not pay to produce the extra cases of fruit; but in the Hutt district tomatoes need to be forced to a certain extent—that is, at the end of the season—



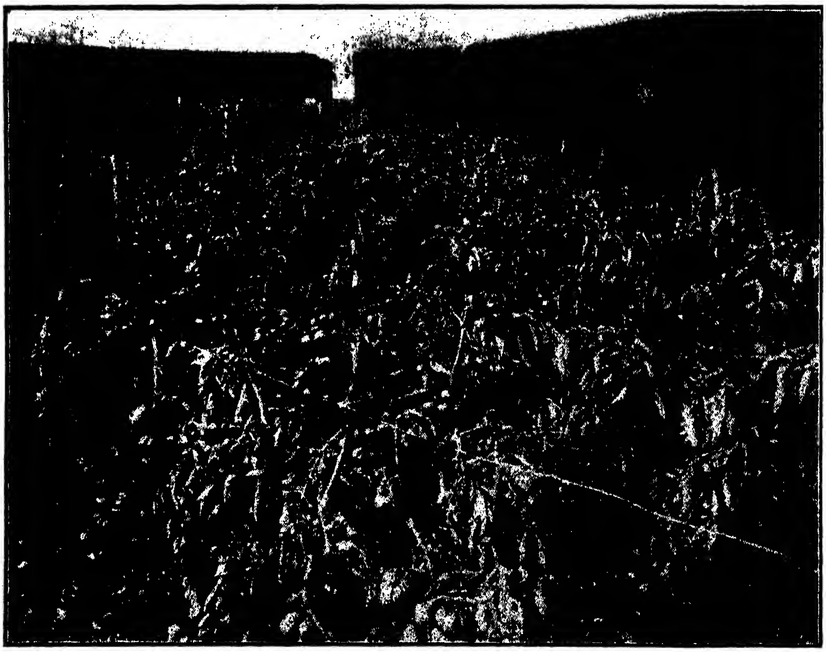
PLOT NO. 1.—PLANTS AFFECTED BY FROST.

on account of the very severe frosts experienced. Had winter not set in six weeks earlier last season than usual, Plot No. 1 would have given a very good yield with only 8 cwt. of manure to the acre. However, the fruit was slow in ripening, and a great deal was damaged by the frosts, which continued throughout the month and which did considerable injury to other crops. The illustration gives an idea of the damage done.

* Analysis of Gear garden manure: 5·5 per cent. phosphoric anhydride (soluble), equal to 12 per cent. tricalcic phosphate (made soluble); 3·2 per cent. phosphoric anhydride (insoluble), equal to 7 per cent. tricalcic phosphate; 4·9 per cent. nitrogen (insoluble), equal to 6 per cent. ammonia; 5 per cent. dipotassic oxide (soluble), equal to 9·2 per cent. sulphate potash.

Diseases.

There were a few plants affected with Irish blight. No sign of the dreaded tomato-spot (*Cladosporium fulvum*) was observed, and there were no signs of black-stripe. This disease can easily be confused with Irish blight by beginners, therefore a brief description will, no doubt, prove instructive. The disease will attack the fruit as well as the leaves and stem. Discoloured patches appear, and become sunken owing to the collapse of the tissues. These patches become covered with a velvety pile of blackish,



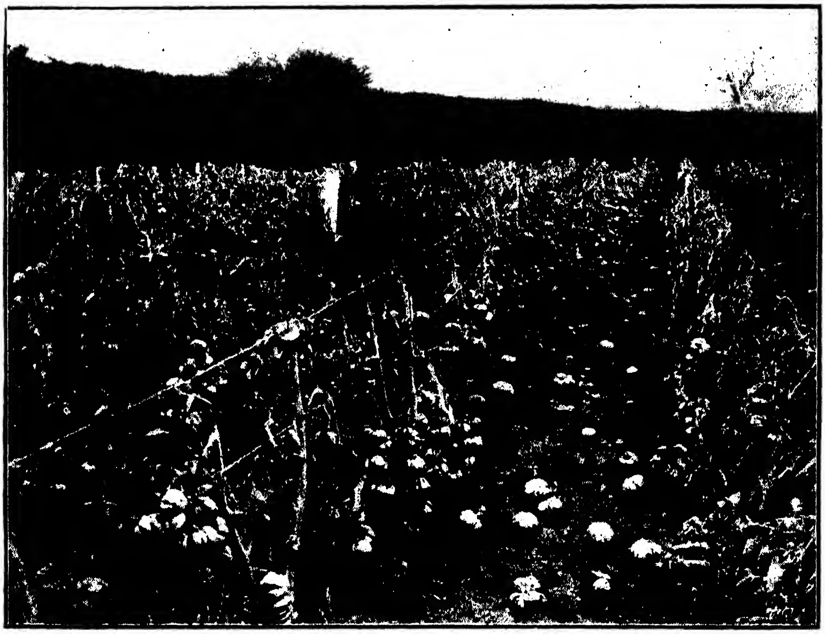
Plot No. 2.—Crop showing Complete Loss as a Result of the Frost.

olive-coloured fungus. Long blackish stripes also form on the stem, and sometimes irregularly shaped blotches on the leaves. Infection generally takes place through a wound, and the only method of dealing with it up to the present time has been to burn the affected plant immediately and to spray the ground thoroughly with Bordeaux mixture. The spores of this fungus on the tomato may infect the potato-plant, or *vice versa.* Irish blight will cover the plant with a black sooty fungus, attacking leaves, fruit, and stem; the plant ultimately attains a drooping habit, and gradually dies, giving off an offensive odour. Bordeaux mixture is a sure preventive. The above-mentioned results as to freedom from fungus

diseases are attributed to the fact that the plants were sprayed carefully and thoroughly from time to time with Bordeaux mixture.

Caterpillar.

2 lb. of arsenate of lead added to the Bordeaux mixture was used to eradicate this pest. The brand of arsenate of lead proved unsatisfactory, burning the fruit to some extent. Growers will need to exercise great care when purchasing arsenate of lead, and procure only reliable brands.



Plot No. 2.—Another View.

Plot No. 2.

This plot was manured in the same way as No. 1, and planted the same day as manured—11th January, 1913. The plot consisted of 18½ rows. No other manure was used.

Yield.—Each row averaged ten tins to the row, a tin weighing 24 lb. This works out to about 5 lb. or 6 lb. per plant. The tomatoes did not ripen, on account of the frost catching them. Had we been successful with the weather, Plot No. 2 would have produced a large yield with only 8 cwt. of manure per acre. The photo showing most of the fruit on the ground was taken after very severe weather.

Tomato-spot (*Cladosporium fulvum*): No signs of this disease. Irish blight: A few plants affected. Black-stripe: Two plants attacked. These were pulled up and burned. Caterpillar: Prevalent.

Spraying.—Bordeaux mixture was used regularly every fortnight for the control of fungus diseases, and proved beyond doubt an excellent preventive. Arsenate of lead was used in conjunction with Bordeaux mixture for the control of caterpillar. This proved unsatisfactory, for the reason previously mentioned. The strength of mixture was 4 lb. sulphate of copper, 4 lb. fresh roche lime, 40 gallons water, 2 lb. arsenate of lead.

PLOT NO. 3.

This plot was later still in the planting, and consequently never had time to produce any quantity of fruit on account of the rough weather.

Spraying with Bordeaux mixture was continued in order to note results, and I can safely say that there were no signs of diseases observed in this plot. The soil had not been used or worked for some considerable time. All plants received a liberal supply of water after planting. On the first signs of fruit the plot was manured at the rate of 1½ cwt. bonedust and 2 cwt. superphosphate per acre.

BORDEAUX MIXTURE.

This mixture has proved to be undoubtedly the best at the present time for fungoid diseases, and, as stated in the July issue of the *Journal*, it should be sprayed on the under-surface of the leaves. In some cases there is difficulty in procuring proper lime. The Department is at present encouraging firms to buy nothing but fresh roche lime, so that it will not be long before the grower will be able to rely on the material. Roche lime that looks like cakes of oatmeal before slaking should be avoided. Buy only hard, snowy-white roche lime. Great care should be taken to keep it in an airtight box or tin, otherwise it will slake with the moisture of the air. A cheap method is to use biscuit-tins, and cover the tops with brown paper, and paste the paper lapping over to the sides of the tin. In slaking lime several growers try to rush the process through too quickly by covering the lime with water. Doing this often results in a bad slake. The proper method is to sprinkle water over the lime gradually. In five minutes the lime will crumble to a powder. Then the quantity of water required may be added. It is always advisable to use blue litmus paper to test the mixture. If the paper turns red, then more lime is required; but, on the other hand, if it has retained the blue, then the mixture is correct.

Mr. Brasell, a tomato-grower of very long experience, had previously used Burgundy mixture with poor results. Last season all his plants were attacked by disease. This season he used Bordeaux mixture, as advised by the Department, with excellent results, and is now quite convinced that the latter mixture is the better.

Sixteen rows of tomatoes belonging to Mr. Brasell were used for manurial experiments, and were divided into four plots of four rows each. The tests were conducted by Mr. Brasell, who reports as follows:—

Plot No. 1.—Planted November, 1912; Top-dressed with 8 cwt. Gear garden manure per acre on 12th December, and 5 lb. potash and 15 lb. sulphate of ammonia on 9th January, and 5 lb. potash and 15 lb. sulphate of ammonia on 17th February, per row.

Plot No. 2.—Planted November, 1912: Top-dressed with 8 cwt. Gear garden manure per acre on 12th December, and 5 lb. potash, 7 lb. nitrate of soda, and 8 lb. sulphate of ammonia on 9th January, and on 17th February, same as on 9th January, per row.

Plot No. 3.—Planted November, 1912: Top-dressed with 8 cwt. Gear garden manure per acre on 28th December.

Plot No. 4.—Planted November, 1912: Manured with 25 lb. basic slag per row.

Results.

Plot No. 1, good medium crop. Plot No. 2, good medium crop; fruit ripened more quickly. Plot No. 3, fair crop; fruit small and slow in ripening. Plot No. 4, good crop; biggest return of fruit on the lower trusses, with sturdier plant-growth.

Further experiments are again to be tried at Mr. Brasell's place this season. Those interested in the experiments are at liberty to visit the property on visitors' day, which will be advertised.

In conclusion, I have to thank Mr. Brasell for the valuable assistance he has afforded the Department in conducting these experiments, the results of which, it is hoped, will prove of considerable benefit to the tomato-growers in the neighbourhood and elsewhere.

Mr. Alex. McTaggart, M.S.A., formerly an officer of the Department, who left New Zealand about five years ago to study agricultural science abroad, having accomplished his purpose, has returned to the Dominion. He spent four years at the Ontario Agricultural College at Guelph, in Canada, and gained the degree of Bachelor of Science in Agriculture of the Toronto University. Subsequently he studied for a year at the Cornell University, New York, and there received the degree of Master in the Science of Agriculture.

STRAWBERRY-CULTIVATION.

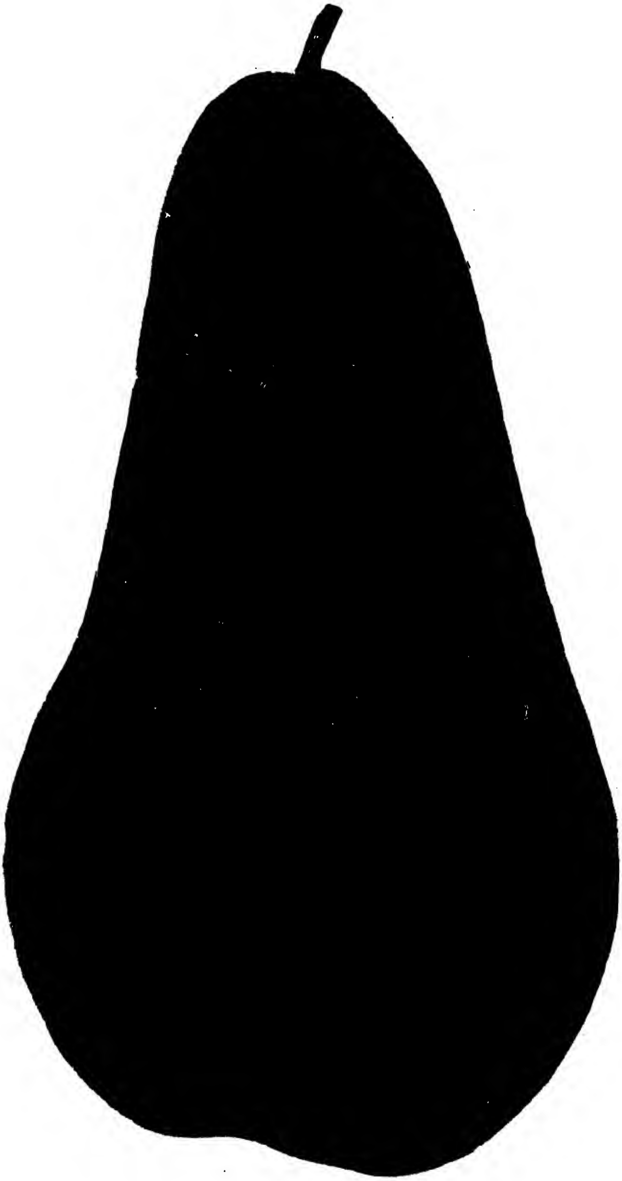
PROPAGATION OF PLANTS.

W. A. Boucher.

Perhaps the most vital matter in connection with strawberry-cultivation is that the grower shall be able to secure hardy and productive plants for setting out in his fruiting-beds from season to season. It is obvious, considering the intense culture—involving the labour and preparation of the land, heavy manuring, and the necessary and frequent after-cultivation—that the yields from the plants shall as nearly as possible reach the maximum. This can be attained only by setting out prolific plants of strong constitution. In order to secure plants possessing these necessary characteristics, special beds for propagating should be provided. The plants for these beds should be carefully selected, all showing a weak constitution being discarded. They should be regarded as the mother plants, and their energies directed entirely to the production of strong stock, to be transplanted in due course to the cropping-beds. From this it will be seen that the plants in the propagating-beds should not be allowed to fruit, all blossom being pinched out, in order that the plant may conserve its energy and throw as much vitality as possible into the young runners. If the propagating-plants are exhausted by fruiting they will not be able to impart the desired strength to the runners, and so ensure .the establishment of vigorous fruiting-plants.

In strawberry as in other branches of fruit culture it is desirable to establish and maintain a strain of vigorous stock having good cropping proclivities of the particular variety or varieties desired. The strawberry-grower will always find it to his advantage, as far as possible, to carry out this work himself. He will then know exactly what he is doing, and will have some guarantee as to the result of his operations. To purchase new stock without a knowledge of its history is to a large extent working in the dark, and too often will lead to disappointment and failure. More depends on stock of undoubted constitution than on anything else in the business of strawberry-growing, and it is only the grower who appreciates this fact who will establish his business on a permanently successful footing.

Calibasse Grosse Pear.—The pear illustrated on the opposite page (full size) was grown on No. 7 fruit-farm, planted in connection with the Waerenga Experimental Farm. A number of the pears were over 1 lb. in weight. Calibasse Grosse is a very large pear of fair dessert quality, and is a fair cropper. Its season is from February to March.



LUCERNE IN MARLBOROUGH.

E. CLIFTON.

THE repeated advocacy of the cultivation of lucerne in the columns of the *Journal* may possibly be considered by some who have not seen this fodder crop to be wearisome and needless — that it is a fad, and that the value of the crop is exaggerated. Now, let me say again that it is impossible to exceed in the most active advocacy the use of this plant to the uttermost to the farmers of New Zealand. The usual acceptance of lucerne is that there should be a small plot as an auxiliary — something to look at, something to be cared for very specially, something of which the utility has yet to be tested, something, in fact, set down to the theorist. A visit to Marlborough would at once dispel such ideas, and, if seeing is believing, it is recommended to all progressive farmers to visit Marlborough and inspect its lucerne-farms. These are not single fields; they are simply farms of lucerne. They are a revelation even to those who have observed lucerne in other parts of the Dominion.

The Department realizes to the greatest extent how desirable it is that the farmer, and especially the dairy-farmer, should avail himself of lucerne. As notified in previous issues of the *Journal*, the Department is again offering to a limited number of farmers sufficient seed, lime, and inoculated soil to test one acre. Those who are progressive should avail themselves of this offer. And the advice is again repeated—"See the lucerne-fields of Marlborough!"

A flock of sheep at Ruakura Farm of Instruction is being grazed on a cow pasture (to equalize the growth of grass), half of which had been dressed with guano and the other half with basic slag. It is noticeable that the sheep are eating the latter portion much more closely than the former.

The average cow of the ten best herds of one of the Department's illustration cow-testing associations produced last year 271 lb. of butter-fat, while the average cow of the association produced only 201 lb. The difference in value, at 1s. a pound for butter-fat, equals £3 10s. per head. The census for the year 1911 credits New Zealand with 633,733 cows. Could each of these be increased in productive capacity by the difference recorded above, the value of the increased yield would exceed the value of our annual export of either butter or cheese.

KUMERAS, OR SWEET POTATOES.

W. C. BERRIDGE.

WHEN the Maoris first came to New Zealand they brought many kinds of sweet potatoes, and from these doubtless many sorts or variations arose. Some of the old Natives claim to have knowledge of about forty varieties. The difference between many of them was very slight. Some had variously shaped leaves, some differently coloured skins, and in others the flesh was pink or red. In some varieties the leaves were nearly round or heart-shaped, in others these were deeply palmated, and others again presented intermediate features. An old Maori supplies the names of sixteen varieties which he himself has grown - viz., Uti-uti, Taromahoe, Pioio, Rekamaroa, Kaitorangi, Koreherehe, Rawhiwhi, Tukau, Monenehu, Huirarangi, Pehu, Rahupa, Kahupaheke, Waiha, Tarihana, Whakahekeraro. These were all grown from pieces of the tubers on ridges or hills. The Maori elaborated an actual ritual relating to the cultivation of the kumera. It was to him the crop of the highest importance. The time of planting was decided by the appearance of certain stars, and an almost general cessation of war was accepted at the harvest. The seed pieces of the tubers were always planted with the cut part facing the north, the Natives claiming that the seed would either rot or else produce no tubers if planted in any other direction. I have endeavoured to show the fallacy of this by growing them facing all directions, but the Maoris merely say it does not matter with the pakeha, but if a Native did so the crop would be a failure. They decline to experiment with the kumera.

I have endeavoured to ascertain when the Maoris first grew the variety called by them "Waina." Although this variety is cultivated more largely than any other kind, it is considered by the Natives to be only a late introduction to New Zealand, and was not known to the older men in their youth. The most reliable account I have been able to obtain of its introduction to New Zealand was from Mr. Val Savage, of Opotiki. Some time in the "fifties" he was employed repairing boats on the "Rainbow" whaler, and during dinner he was offered some sweet potatoes very much larger than any he had previously seen among the Maoris. On inquiring from the captain where they were grown he was informed

that the vessel had brought them from the South Seas—Rarotonga, I believe. Mr. Savage procured some from the captain, and divided them among the Maoris. Some were sent north and some to the Bay of Plenty. They rapidly became appreciated in many parts of the country. This potato was called "Waina" by the Maoris because it was propagated by sets or plants or part of the vine (*waina* being the nearest pronunciation the Maoris could make to "vine"). Previous to the introduction of this variety the kumera was grown from a piece of the tuber, not from sets or plants. The Waina often sports, and plants with both yellow and red tubers often appear in a crop, although only plants from red tubers be planted. Others will be found of varying shades, from deep crimson to pink, and even both colours on one tuber.

It is important to remember that in New Zealand the kumera can be grown only in the warmer parts.

A sandy soil, or one with a liberal proportion of sand, suits the sweet potato. Heavy applications of fresh stable manure stimulate the growth of the vines at the expense of the root. It has been found better to apply stable manure to the previous crop, as by this method the manure will have become thoroughly incorporated with the soil before the sets are planted on the land. It has also been noted that the tubers will be small, and the yield unsatisfactory, on soils that do not contain sufficient organic matter to produce a fair growth of vines. A dressing of lime hastens the maturity of the crop and increases the yield. The plot that received a dressing of lime showed a distinct improvement both in strength of vine and size of tuber. It is better to apply the lime some time before planting the crop. The sweet potato appears to be one of the few crops that thrive as well with artificial fertilizers as with stable manure, or better with the former than with the latter. A combination of the two, however, gives the best results. The United States Department of Agriculture recommends a mixture composed of 200 lb. sulphate of ammonia, 200 lb. dried blood, 1,200 lb. superphosphate, and 400 lb. muriate of potash, applied at the rate of 5 cwt. to 10 cwt. per acre. For most soils a fertilizer should contain 5 per cent. nitrogen, 7 per cent. phosphoric acid, and 10 per cent. potash.

The American varieties are grown better from sets or plants obtained by planting the tubers closely together—but not touching—on a hotbed. When the sets or plants are from 4 in. to 5 in. high they are detached from the tubers, care being taken to hold the latter in place with one hand while pulling off the plants with the other. When sand is used to cover the tubers the roots come

away better, and if the tubers be not disturbed in drawing off the sets they will yield several crops of plants or sets.

The soil should be worked to a fine tilth, and the tubers will be shaped better than when grown in a lumpy soil. It is well to sow the fertilizer broadcast, and work it well into the soil by harrowing. The land should be thrown up in ridges with the plough—preferably running north and south.

The best time to plant out is immediately before or after rain. Scarcely any plants will fail to grow if the soil be damp. Should dry weather occur when planting out, this need not prevent the work going on, as about a quarter of a pint of water about each plant (taking care it is in direct contact with the roots) will ensure growth. When this is done, planting even in the hottest weather can be undertaken successfully. As natives of the tropics, kumeras revel in the hottest weather.

When the ridges are made high, it is a good plan to make a basin for each plant. This confines the water given closely to the roots, and affords shelter to the plants when cutting winds prevail. When weeding the ridges with the hoe the high crest is pulled with the weeds into the furrows, where they are easily killed by means of the horse-hoe or cultivator. Scarifying will also conserve the moisture in the hot weather, and so benefit the crop.

Many methods have been tried for storing sweet potatoes, such as packing in dry sand, putting in clamps, storing in sheds, &c., but experience teaches that storing in *ruas*, as the Maoris call their underground pits, is the most successful. If properly handled, the potatoes can be kept in this manner until the next crop is ready to dig. The kumeras must be dried thoroughly, and the pits opened and ventilated every fine day until the sweating period is over. This generally takes about a month, and even afterwards the pits should be ventilated occasionally. The tubers should be kept from direct contact with the bottom and sides of the pits by a layer of dry fern. It is advisable before using the *rua* again to clean out all fern and rubbish, and to burn sulphur. This will kill all wood-lice and insects, and help to destroy germs of decay, fungus, &c.

According to variety, the tubers contain, by analysis, when first dug, from 61 to 79 per cent. of water, and from 4 to 11·9 per cent. of sugar. Six months after digging they contain 50 to 70·82 per cent. of water, and from 7·55 to 19·71 per cent. of sugar, according to variety, the variety giving the highest sugar-yield being the Early Bunch yam, while the lowest is the Delaware. (Analyses by Professor Duncan, Adriance, U.S.A.)

The varieties grown at present at the Tauranga Experimental Farm are—

Maori Varieties.

Uti-uti.—A long white or pale straw-coloured variety, very popular with the Maoris, as it is easily grown. Tubers compact in the hill; does not make so much vine as some others.

Rekamaroa.—Somewhat similar to Uti-uti, but makes far more vine, and the tuber is sweeter. White flesh; deeply lobed or cut foliage.

Taromahoe.—In general character like the two mentioned above, but the leaves are not so deeply lobed.

Pehu.—A small variety, not much thicker than a man's finger; not a desirable variety.

Whokoreke.—A medium-sized sweet potato, flesh deeply stained with red; not desirable.

Several other Maori varieties were tried, but did not mature. A Japanese variety, under the name of *Ipomaea batatas*, was also tested. This variety when young has purple leaves, which become greenish-bronze with age; very strong running vines, and long spindle-shaped roots of a dark-crimson colour. The flesh is dark yellow and somewhat coarse. It becomes spongy with keeping.

American Varieties.

Red and White Bermuda.—These appear to be identical with the varieties grown by the Maoris, called by them "Waina," and grown in America under various names, such as "Negro-choker," &c. It is one of the most popular varieties grown, as it adapts itself to various conditions under which sweet potatoes can be grown. It attains a large size, tubers from 6 lb. to 9 lb. not being uncommon.

Nancy Hall.—A comparatively new variety, claimed to have been raised from a seed that appeared among a packet of flower-seeds. It is a golden-yellow tuber of medium size, moist sweet flesh, yields fairly well, medium-strong growth of vines. A promising variety.

Southern Queen or Hayman.—A medium to large tuber, white, with moist sweet flesh, pointed oval-shaped tubers, strong vigorous vines—much thicker and stouter than most varieties. The foliage is nearly round, slightly shouldered.

Vineless or Bunch Yam.—A medium-sized tuber, yellow skin; yellow, moist, sweet flesh; grows compactly in the hill, and does not make much vine. Some plants appear not to make any running vines, while others make a medium growth. Doubtless, the running vine could be eliminated by selection.

Red Jersey.—A medium-sized tuber, short spindle-shaped, with crimson skin and yellow flesh, mealy and dry. This variety makes long slender vines, with leaves lanceolate and somewhat shouldered. It appears to be a good keeper.

Yellow Jersey.—Similar to the Red Jersey, except in colour, which is a rich golden yellow. It does not appear to be a good cropper, but the quality is excellent, being sweet, dry, and mealy.

Pumpkin Yam.—A strong vigorous grower, but appears to be too late for this climate. It made no tubers the previous season, and is the last this season.

Last season was favourable to the growth of the sweet potatoes at the Tauranga Experimental Farm, being dry and hot; but, owing to the fact that most of the crop was grown in a gully to protect it from the winds, the early frosts in March cut the plants back before the tubers were matured. Some of the varieties did not mature. This year it is proposed to grow the crop between the fruit-trees, to take advantage of the belt of shelter-trees. Later there will be a small quantity of the more promising varieties available for distribution.

SEMI-OFFICIAL TESTING.

STATEMENT TO 8TH OCTOBER, 1913.

W. M. SINGLETON.

THE list below gives the production of those purebred Holstein Friesian and Jersey cows which have qualified in semi-official test since the first statement published in last month's issue of the *Journal.* There are a number of cows which were in test last season whose complete records will be given in later issues.

One of the requirements for qualification for Certificate of Merit is that a cow or heifer after having produced the minimum butter-fat requirement must drop a calf within fifteen months after the commencement of her testing-period. A number of cows have qualified in production, but their names cannot be included in a list such as this until they have again dropped a calf and have been inspected by an officer of the Dairy-produce Division.

A few cows that have put up splendid records are not qualifying for a certificate on account of not calving again within the fifteen-months limit. Records made under such circumstances are likely to be higher than would be the case were the cow carrying her calf for the proportion of her period under test that corresponds

to ordinary good dairy practice. Dairymen will recognize, therefore, that if a breeder be granted a Certificate of Merit for a cow's production it is an indication of genuine work made under average dairying conditions, so far as regular calving is concerned.

Name of Cow.	Name and Address of Owner.	Age of Cow.	Yield for Season.		
			Days.	Milk.	Fat.
	Holsteins.	Yrs. days.		lb.	lb.
Gipsy Girl ..	Maitland Leith, Woodlands	3 259	317	13,840·50	504·28
Magpie VII ..	John Donald, Westmere ..	Mature	314	9,950·50	480·94
Maid of Leith ..	W. I. Lovelock, Palmerston North	,,	324	11,310·50	423·12
Lady Wood ..	Maitland Leith, Woodlands	3 276	347	12,543·70	415·75
Princess Galatea ..	Newton King, New Plymouth	Mature	289	12,307·50	411·04
Glendowie Daisy	C. C. Buckland, Cambridge	,,	364	11,694·20	408·54
Glendowie Glory ..	,, ,,	,,	353	9,644·55	405·77
Ashlea Daphne ..	J. Liggins, Tokomaru ..	,,	334	10,871·50	400·29
Colantha Pietertje Buttercup	W. Remnant, Palmerston North	2 243	314	11,187·00	399·18
Netherland Pride	J. Donald, Westmere ..	3 125	308	10,646·50	331·28
White Rosette ..	J. Liggins, Tokomaru ..	2 293	316	7,362·50	327·62
Carolina Paul ..	,, ,, ..	1 342	314	7,926·50	325·16
Netherland Duchess III	J. Donald, Westmere ..	3 360	317	7,874·50	319·84
Nig Alcartra Maud	J. Liggins, Tokomaru ..	2 267	349	8,882·00	316·66
Dutchland Colantha Mercena	,, ,, ..	3 35	289	7,790·50	316·21
Know-not III of Brundee	W. H. Bayliss, Mangatainoka	2 222	289	7,948·50	270·45
	Jerseys.				
Miss Urenui ..	R. J. Linn, Normanby ..	Mature	349	9,293·00	481·30
Roses Sweet ..	F. E. Hellyer, Dunedin ..	,,	324	8,781·50	453·57
Little Prim ..	A. Moreland, Papatoetoe	3 278	337	8,742·00	450·38
Belvedere Briar ..	E. Eagle, jun., Belvedere	2 356	348	7,614·00	442·73
Florence ..	R. J. Linn, Normanby ..	Mature	334	7,265·00	434·50
Queen Marjorie II	A. and J. O'Donnell, Inaha	4 138	349	7,649·00	430·71
Bilberry VI ..	E. Eagle, jun., Belvedere	Mature	308	8,842·50	426·15
Countess Meg ..	A. H. Halcombe, Urenui	,,	262	7,042·00	403·69
Princess May ..	W. J. Hall, Matatoki ..	3 315	330	7,398·65	400·20
Rita	R. J. Linn, Normanby ..	Mature	302	7,103·00	388·69
Lady Gleam ..	A. and J. O'Donnell, Inaha	4 361	308	8,466·50	387·78
Bilberry IX ..	E. Hodges, Waimana ..	3 346	307	6,306·25	384·26
Forest Queen ..	Dr. F. J. Watson, Bulls	4 217	354	7,107·00	380·08
Wild Rose II ..	E. Eagle, jun., Belvedere	Mature	317	6,644·30	379·68
Flandrine ..	A. Moreland, Papatoetoe	3 160	346	7,273·75	371·50
Bonnie ..	R. J. Linn, Normanby ..	Mature	306	6,951·50	371·21
Maud Lambert ..	Strange Bros., Mangaiti	1 330	351	7,129·55	365·47
Lady Blizzard ..	A. and J. O'Donnell, Inaha	4 29	298	6,142·50	361·05
Cowslip IV ..	E. Eagle, jun., Belvedere	Mature	332	7,138·00	359·09
Queen's Fair Maid	E. Hodges, Waimana ..	2 330	296	6,816·75	323·37
Rosetree ..	R. F. Wilkinson, Pukekohe	3 5	318	5,624·25	317·62
Lady Marmion II	A. and J. O'Donnell, Inaha	2 350	258	5,641·50	301·31
Gem of the South	F. E. Hellyer, Dunedin ..	1 206	295	5,816·75	300·85
Sweet Lilac ..	A. Moreland, Papatoetoe	2 287	339	5,356·75	299·43
Princess Lambert	Strange Bros., Mangaiti	1 313	356	5,260·80	290·96
Queen Marjorie III	A. and J. O'Donnell, Inaha	2 295	292	5,858·50	284·97
Verbena of Meadowbrook	F. E. Hellyer, Dunedin ..	1 318	290	4,951·25	272·17

MORTALITY AMONG LAMBS.

C. J. Reakes, D.V.Sc., M.R.C.V.S.

In the April, 1913, issue of the *Journal* the condition termed acute congestion of the kidneys in lambs was dealt with, among other lamb troubles, and its causes described, together with the simple preventive treatment necessary. It is a matter for regret that a number of lambs have been lost this season as a result of kidney-congestion, their owners evidently not having observed the necessary precautionary measures.

In some cases which have come under the notice of officers of the Live-stock and Meat Division it has been quite clear that this lack of knowledge, or lack of belief in the information furnished by the Department, has been responsible for a considerable loss. One instance which was brought under my personal notice was furnished by a shepherd (a very trustworthy and capable man in other respects) who would not believe that overnutrition was responsible for the trouble, but held the opinion that the mortality among the lambs was due to the presence in the stomach of wool-balls. His treatment consisted of putting the lambs on their backs and rubbing their bellies. On what line of reasoning he was working it is difficult to understand, but presumably the idea was that the rubbing would have the effect of "moving on" the offending wool-ball to some part of the anatomy of the animal where it would cease to cause trouble. If so, he was utterly wrong, and naturally the lambs died in spite of his mistaken, though doubtless well-meant, efforts.

In the article in the April issue of the *Journal* it was stated that an examination had been made of the stomachs of 4,043 fat, healthy lambs killed in freezing-works, and that of this number 20 per cent. had been found to contain wool-balls. It will be of further interest to note that in the case of one works, of 500 examined 49 per cent. contained wool-balls, and in another 48 per cent. These old beliefs, which arose in days when better information was unavailable, are hard to kill. Yet stockowners who have adopted the necessary measure of cutting and tailing their lambs as soon as the trouble has made its appearance have realized that the resulting bleeding and consequent relief of the plethoric condition of the lambs has caused the mortality to cease. I hope that when the next lambing season comes round less will be heard of deaths through kidney-congestion.

TREATMENT OF POOR COUNTRY.

THE CLIFTON PARK SYSTEM.

NOTHING that has been accomplished in the work of improving and bringing into profitable use poor arable lands, impoverished and periodically drought-stricken, has been of such interest as the Clifton Park system. This was evolved and carried to a successful issue by a landowner of Roxburghshire, Scotland, Mr. Robert Henry Elliot, of Clifton Park, on his farm at Clifton-on-Bowmont, of 1,250 acres, situated on the Bowmontwater, at the foot of the Cheviots, the experimental fields being of an altitude ranging between 400 ft. and 750 ft. When the farm came into Mr. Elliot's possession it was in an impoverished condition, added to which the land—for the greater part poor, stony hill country—was subject to drought, generally experienced every third season. To make this farm fertile and profitable was the problem Mr. Elliot set himself to solve. That he succeeded is now a matter of agricultural history. It is not necessary to enter into the details of the experiments, which were instituted in the year 1890, and are practically in progress at the present time, by reason of the British Board of Agriculture having made a small annual grant to Mr. Elliot's successor in order that the essential features of the Clifton Park system of farming might be continued. It is sufficient for our purpose to describe the principles underlying the Clifton Park system and the results achieved. The fact should be emphasized that the country being dealt with was arable.

The success of Mr. Elliot's work was based practically upon his appreciation at the outset of the fact that deep-rooting plants are not only drought-resistant but are the cheapest and best means of tilling the soil and increasing the volume of the plant-feeding area. The chief objective, therefore, was to secure the best grass-seed mixture for the purpose. Two families of plants formed the basis of the ideal seeding—clovers (of the right description) and burnet, chicory, and kidney vetch. Undoubtedly the clovers and kidney vetch play an important part in the good pastures established on the once uninviting soil of the locality, the deep-green colour of the clovers and grasses being doubtless due to the atmospheric nitrogen produced and stored in the root nodules of these plants. Abundance of clover—the late-flowering red variety being the description employed at Clifton Park—is certainly a feature of the system, kidney vetch coming next in importance. The deep-rooting plants of kidney vetch, burnet, and chicory enable the clover-roots to get well down. Speaking of the Clifton Park experiments, Mr. James Hunter, of Cheshire, a close student of Mr. Elliot's work, remarked, "When the time arrives for ploughing the four-year-old turf it will be found of such a thickness as materially to add to the ploughing-depth of the field, and to convert a mineralized soil, devoid of humus, into a fibrous, humus-filled soil, capable of growing the succeeding crops of the rotation without manure."

The Clifton Park experience goes to show that the best of the large-growing, deep-rooting grasses for light hill lands are cocksfoot, tall oat-grass, and tall fescue, and that the best grass of fine growth for closing up the bottom is rough-stalked meadow-grass. Following is the seeding that was found most successful (41 lb. per statute acre) :—

10 lb. cocksfoot-grass.	1 lb. alsike clover.
5 lb. tall fescue-grass.	1 lb. yarrow.
5 lb. tall oat-grass.	8 lb. burnet.
1 lb. rough-stalked meadow-grass.	3 lb. kidney vetch.
2 lb. late-flowering red clover.	3 lb. chicory.
2 lb. white clover.	

The field on which this mixture proved so successful is thus reported on: "In 1904 this 25-acre field of poor hill land (formerly reckoned to be the worst on the farm) kept as much sheep stock as the grass fields, aggregating 87 acres, of the adjoining farm, which is much better land, but farmed on the old five-course system, and on which the generally used rye-grass and clover mixtures have been used."

The usual rotation of the Clifton Park system is one of eight years, thus: First year, after turnips, lay down to grass with a thin seeding of oats or barley. Four years' grass is then taken, and at the end of the fifth year from the date of sowing down the turf is ploughed, and the resulting humus and nitrogen provide ample food for the succeeding crops of the rotation. Sixth year, turnips, taken after the grass; followed by seventh year, oats; followed by eighth year, turnips; and then the rotation is repeated *ad infinitum*. If necessary, the rotation may be varied, and the grass may remain as long as the grazing is profitable.

"To prove," writes Mr. Hunter, "that turnips may be successfully grown solely with the aid of a good turf and without any artificial manure, the East Countridge field of 15 acres was sown with turnips in 1904. A splendid crop was produced. I inspected it when mature, and could desire nothing better. In 1903 13 tons 14 cwt., and in 1904 (an unfavourable season) 12 tons 7 cwt., of potatoes per statute acre were grown at Clifton without the aid of any manure other than the decomposed turf, and it is claimed that the eating-quality of these potatoes was superior to those grown with the aid of farmyard manure."

For permanent pasture on poor hill country the following mixture has been evolved by Mr. Hunter, in consultation with Mr. Elliot (38 lb. per acre):—

10 lb. cocksfoot-grass.	4 lb. kidney vetch.
2 lb. crested dogstail.	2 lb. white clover.
2 lb. Italian rye-grass.	½ lb. alsike clover.
1 lb. rough-stalked meadow-grass.	2 lb. late-flowering red clover.
4 lb. chicory.	2 lb. rib-grass.
8 lb. burnet.	½ lb. yarrow.

INBREEDING AND FERTILITY.

E. N. WENTWORTH, in the *Breeders' Gazette*, Chicago.—Abridged by the International Institute of Agriculture.

FROM the days of the earliest practice of inbreeding there seems to have been a definite idea that it caused degeneration of the stock, evidence of which was supposed to be shown in decreased size, vigour, longevity, and fertility.

An experiment on this subject was started through an accident by which mice destroyed the cultures of fruit-flies that the writer used for hereditary-demonstration purposes in his laboratory-work. From the wreckage three pupæ were saved that gave a living pair of flies to start with. On mating, they produced 126 offspring.

In a previous article the writer has spoken of the importance of the law to segregation on the tendency of characters present in preceding generations to separate out in certain individuals.

The offspring of the flies were divided into four strains, one high in fecundity, one low, and two medium. The interesting thing is that the high and low strains breed true, while the middle strains show in many individuals the segregating-out of other types. Several hundred individuals were bred, but the table shows only the average production for each line.

Four pairs of flies from the 126 in the first generation, when inbred, gave the following number of offspring:—

	High Line.	Low Line.	Two Medium Lines.
3rd generation	128·7	35·9	78·9
4th ,, ...	134·6	30·1	81·2
5th ,, ...	132·2	29·7	83·7
6th ,, ...	135·6	32·7	68·1
7th ,, ...	133·4	28·7	60·1
8th ,, ...	140·1	29·4	71·3
9th ,, ...	138·0	25·7	69·1
10th ,, ...	141·3	24·6	66·3
Average	135·9	29·5	72·1

This shows the absolute distinctness of the three groups. When all the groups are added together and the averages taken, each generation after the fifth shows

a decrease, similar to the experience of the practical breeder. The third generation equals 80·6; the fourth, 81·8; fifth, 109·8; sixth, 101·5; seventh, 98·1; eighth, 78·0; ninth, 75·5; and tenth, 74·6.

The rapid lowering of the averages in the last five generations would be interpreted by the breeder, who thinks only in terms of averages, as excellent proof of the injurious effect of inbreeding. We, however, see that the inbreeding was not at fault, for in the last generation the segregated high line gave its highest production—viz., 141·3 individuals. Only one lesson can be drawn from this—viz., that the breeder must study his animals individually. Those men who have succeeded by inbreeding have done so by their capacity for careful selection, while those who have failed simply waited for good characters to appear of their own accord.

Inbreeding does not cause degeneration—it only allows weaknesses to appear; and it also brings out the good points, so that the breeder need only select the most suitable animals for further breeding operations.

The distribution of the groups would indicate a simple pair of factors and a 1 : 2 : 1 ratio, as considered in Mendelian inheritance. This is only apparent, however, and more study is needed to elucidate the factors completely.

The Michigan Board of Education has designated the Central State Normal School as the training-school for the preparation of teachers of agriculture in the public schools of the State. The State Legislature will be asked to appropriate sufficient funds with which to construct an agricultural and general-science building with suitable lecture-rooms, laboratories, &c., and purchase a demonstration farm.

It is claimed that soil-contact as it reacts upon the child creates producers and fosters ability, resourcefulness, and self-reliance. Garden-work is deemed auto-educative, since the planting and caring for the garden powerfully reflect the child's work and thought. School-gardening instils civic interest and engenders the esthetic, results in developing the faculty of co-operation, constitutes the "missing link" between the home and the school, and gives the child widened interests.—*L. H. Harvey, U.S.A.*

Maritime or Seaside Pine *(Pinus halepensis, Var. Maritima)*.—This pine is grown extensively at Arcachon, an inlet of the Bay of Biscay, south of Bordeaux, where there are sand-dunes up to 400 ft. in height. This sand was drifting over the rich flats called "The Landes." The Landes is noted for grape-growing and wine-production. Years ago the French Government offered a reward to any one who could discover some means of stopping this drifting of sand, which was working inland rapidly. A French engineer took the matter in hand and sowed seeds of the above pine. Now there are vast forests as thick as any New Zealand bush. The products from the above pine-trees are turpentine, charcoal, and telegraph-poles, which are sent all over Europe. The result of these trees being planted at Arcachon, which was once a small fishing-village, has been to make it a large and fashionable watering-place. A fine monument is erected there in honour of the engineer who utilized *Pinus maritima* as a sand-binding agent, and thereby transformed the district.

THE HEMP INDUSTRY.

W. H. Ferris.

With the continuance of favourable weather for harvesting and milling operations the production of fibre during the past month constituted a record for that period of the year. Mills are generally working at high pressure, and everything points to the present season proving one of record production. While every effort is being made to turn out as much fibre as possible, quality, it is satisfactory to know, is not being neglected. With the continued demand for "good-fair," and the value of this grade being on a very payable level, millers are being encouraged to work to a better standard—a good thing for all concerned. Though the quality of the fibre coming forward for shipment last month was generally good, there was a decided tendency in more than one district to ship badly scutched lines. Nothing is more disheartening than to open a line of hemp from good leaf, well stripped, washed, and bleached, and to find it has been so badly scutched that it must be placed in an inferior grade. In one case at the Napier port I had to grade such a line (200 bales) "fair" by reason of the very unsatisfactory scutching, though, had this simple process been carefully done, the line would easily have reached "good-fair" grade; and, worse to tell, the tow from the same mill (20 bales) had to be condemned.

It is quite apparent from the lines reaching the grading-stores that little trouble will be experienced this year with diseased leaf. From the worst-affected areas of last season hemp is reaching the shipping ports of a clean, strong, and unbroken character. If the work of milling were only more uniform and better supervision exercised over the conduct of the different processes, it would be possible to export practically nothing but "good-fair" quality this season. Unfortunately, the quality of the leaf does not always determine the quality of the resulting fibre.

Several complaints have been received from manufacturers as to the want of uniformity in certain lines of phormium hemp by reason of bad hanks being baled with better-quality fibre, which hanks have probably escaped the notice of the grader. This is no advertisement for the brand, and does not tend to strengthen the grading system. It is quite impossible for the grader to inspect every hank, and he must depend to a certain extent upon the honesty of purpose of the men engaged in baling the fibre.

THE APIARY.

F. A. JACOBSEN.

THESE notes are written a considerable time before they are intended for practical application. In reading them some allowance must be made for variable climatic conditions. They apply to an average season.

ARTIFICIAL INCREASE.

The autonomy of a colony of bees is completely revolutionized under the guidance and management of a bee-master. To allow the bees to take care of themselves and to increase in their natural manner would spell disaster to him. Therefore a method is adopted by which all colonies are under his complete control, and what is termed "artificial increase" is executed at his convenience. The colonies from which he desires to secure his increase are fed heavily in the early spring, and consequently a strong force of bees are ready long before the honey-flow commences. While this work has been going forward early queens have been reared, and the beekeeper is then in a position to divide equally the very strong colonies. This is done by taking nearly all the brood contained in the frames, with adhering bees, and placing it in a new hive on a fresh location. This hive may be closed for about twenty-four hours, to prevent too many bees flying back to the old stand. The old queen is left in the hive on the first location. The new queen is introduced to the new hive. Two colonies now take the place of one, and under favourable conditions it is surprising how rapidly each will build up to the original strength, and each is thus fitted to store a surplus during the honey harvest.

PREVENTING AFTER-SWARMS.

A novice usually desires to secure, besides increase, a surplus of honey. Therefore it is necessary to prevent more than the one swarm issuing from any hive. Several swarms from one colony would weaken it to such an extent that it is doubtful whether it would gather sufficient supplies to even keep it alive through the following winter.

During fine weather the first swarm will issue about eight or nine days after the laying of the egg, and this is the time that the first queen-cell is capped over by the bees. Eight days after the capping ceremony has been performed the virgin queen is

due to hatch, so that it takes sixteen days from the egg stage before a fully matured queen emerges from the cell. The first swarm is headed by the old queen, and so the colony is queenless for from seven to nine days. To prevent after-swarming it is necessary that during the former part of this period, preferably the fifth day, the bee-owner should destroy every queen-cell but one, which should be that which appears to him the most fully matured, the largest and best-shaped. As quite a number of cells may be found in each colony, often as many as a dozen, it is necessary that each comb be examined carefully. Why I mention the fifth day is because the old queen will have been laying up to the time of her departure, and if the superfluous cells are destroyed before five days after the swarm has issued, the bees would probably make use of these eggs for further queen-cell building. It is not likely that the bees will do this after the eggs are four days old.

How to catch and hive a Swarm.

After a flight in the air for several minutes the swarm will generally settle on some bush near at hand. A shower of water from a spray-pump will assist this object. When it is seen that they intend settling, bring along one of the hives you have prepared for such occasions and place it on the spot you intend it to occupy. Next put an empty super over the frames in the lower story, which should contain full sheets of foundation. When the swarm has settled on the slender limb of a tree, take the clippers and snip off the limb below the bees, and carry the lot to the prepared hive. Place the bees, with wood and all, into the empty super and put the cover on. In the evening the bees will be found on the foundation below, and the super may be shifted.

It does not always happen, however, that the swarm is in such an accessible position as that indicated above, and sometimes it is extremely difficult to hive them. When it is not desirable to cut the branch on which the bees are clustered they should be covered over and protected from the heat of the sun. This will prevent them absconding. Secure a box, shake the bees into it, and turn it with mouth down on the ground. Leave an entrance for the bees by putting one end of the box on a piece of wood or a stone. Towards evening, when all have clustered in the box, dump the bees into the prepared hive on the permanent location, and place the mat and cover in position.

Important.

Should any signs of foul-brood be present in the parent colony, leave the bees in the box for four days, but place them on the

permanent location. During the four days the honey that was brought from the parent colony will have been utilized in building comb, and the bees may then be transferred to the frame hive. The comb built in the box should be melted up for wax.

Extending the Colony.

The proper time to super your colonies, or, in other words, put on a top box, is when the brood-chamber is fairly populated by bees and a little honey is being gathered. Do not delay this work until swarming-cells have been commenced, for then the desired effect will not take place. When supering is done at the proper time it will greatly curtail swarming, as the additional room provided will not make the bees feel cramped for room. When putting on a super, transfer a frame containing honey from the brood-chamber to the centre of the super, and replace with an empty comb from the super. This will induce the bees to commence work immediately in the upper region of their hive.

Queen-rearing.

This special part of apiculture should now be occupying the time of those intending to rear their own stock. It would be superfluous to describe methods of queen-rearing again, as this has previously been done in the *Journals* for October, 1911, September, 1912, and other numbers. However, it is seasonable to mention that young queens are an absolute necessity to the success of bee-keeping as a commercial venture. They assist materially in swarm-control work, gather a large surplus, and if leather-coloured Italians be used, they help greatly to exterminate disease.

TRAINING APIARISTS.

The opportunity afforded at the Apiary of the Ruakura Farm of Instruction for going through a season's course of practical bee-keeping is still being taken advantage of. It speaks well for the high estimation in which our system of commercial bee-culture in New Zealand is held in other countries that in four instances young ladies have borne the expense and inconvenience of coming purposely to the Ruakura State Farm from distant lands to learn the business. In one case a young lady came from England and returned after taking a season's course. In another a lady came specially from Victoria, and quite recently two young ladies arrived from Australia, one from Victoria and the other from New South Wales. The latter are now located at Ruakura, where they remain

as cadettes until the end of next April. By this time they should be so well grounded in the art of bee-culture as to enable them to start intelligently on their own account. It is their intention to settle in New Zealand and to take up bee-farming as a business.

In all there have been about thirty young women and several young men trained at this apiary, and all with whom the Department is in touch are doing well with their bees.

REMOVAL OF APIARY.

E. A. Earp.

A removal of more than ordinary interest to beekeepers took place last month, when 125 colonies of Italian bees belonging to Mr. H. Brickell were railed from Owhiro, Otago, to Temuka, South Canterbury, a distance of 154 miles. To avoid loss in transit the covers were removed and battens tacked on to take their place, and the bottom of each hive was covered with wire gauze. The bees were five days on the journey owing to slips on the railway, but as a result of good packing by the owner the apiary was removed without a single loss. It is Mr. Brickell's intention to engage in beekeeping on an extensive scale, and the apiary referred to above will form the nucleus of one of 500 colonies. The extended operations are due to the fact that the Department is giving the beekeeper more protection and is enforcing the Act with a view to checking the spread of foul-brood, a state of affairs which was not possible before the Act came into force.

A Corner of the Ruakura Apiary.

ORCHARD WORK FOR NOVEMBER.

W. A. Boucher.

Cultivation.

A sufficiency of moisture in the soil is absolutely essential for the well-being of an orchard. In many parts of New Zealand this condition can be maintained only by the careful, thorough, and persistent working of the land with plough, harrow, and cultivator. The results will be manifest in the healthy appearance of the trees and size and quality of the fruit. Especially in the early part of the season is it necessary that the surface should be well pulverized, in order that the moisture in the subsoil may be retained throughout any periods of dry weather that may follow.

Orchard Pests.

Mussel Scale.—Winter or very early spring spraying with red oil should have been carried out for the control of this pest. However, in instances where this very necessary work has not been completed, growers are advised to spray with kerosene emulsion when the young scale are on the move, and before the scaly covering of the jelly-like bodies has become sufficiently hard to be protective against such spraying-compounds as may be used with safety at this season of the year.

Codlin-moth.—Much has been done in many districts during the past few seasons to bring this pest—once the bane of the orchardist—well under control. The result has been that many growers have succeeded in reducing the loss of fruit due to infection by codlin-moth to 1 per cent. or even less. It may be noted as most important that the first spray should be applied as soon as possible after the fruit has set. Especially is this so in the case of pears, in order that the poison which is used for the control of eating-insects may be introduced into the calyx before it closes. With many varieties of apples and pears the period between the dropping of the petals and the closing of the calyx is but a short one. Growers must, when possible, take advantage of this brief period during which to apply the first spray.

Arsenate of lead is now generally recognized as a thoroughly effective remedy for the control of codlin-moth. With an increased

demand there has also been an increase in the number of brands offered for sale. Growers are advised to exercise care and to purchase a reliable article which will produce satisfactory results by preventing infection to the greatest possible extent.

Leaf-roller Caterpillar.—The preventive measures recommended for the control of codlin-moth will, if properly applied, be found to be equally effective for the control of leaf-roller caterpillar. It was noticeable during last season that from some localities a higher percentage of fruit blemished by this pest was marketed than should have been. As the caterpillar is quite easily destroyed, this would seem to indicate that an inferior brand of arsenate of lead had been used.

Bronze Beetle.—Complaints have been received from time to time that arsenate of lead is not as effective as it might be for the control of the bronze beetle. Advice previously given to growers may be repeated perhaps with advantage. The addition of a small quantity of resin solution to the arsenate of lead used for the control of codlin-moth will increase considerably its effectiveness in checking the ravages of the bettle.

Fungus Diseases.—Depending upon the climatic conditions of the season, fungus diseases, such as apple and pear scab and apple-mildew, will prove more or less troublesome during the month of November. Growers are advised not to take any undue risks, but to spray with the Bordeaux mixture either apart from, or combined with, arsenate of lead. In order that there may be no misunderstanding it may be stated that in most districts throughout the Dominion attack by insect pests and fungus diseases may be expected, so that an insecticide and fungicide must be applied either separately or in combination.

GRAPE - CULTURE.

S. F. ANDERSON.

VINEHOUSE WORK FOR NOVEMBER.

WITH regard to the treatment of foliage and the general control of growth, there is not much to add to the notes given in the *Journal* for September.

The generally accepted idea that by stopping the growth of the fruit-bearing shoot the vigour of the vine is directed into producing

larger fruit, if not actually mistaken, has its limits. The production of the finest grapes is brought about by the just balance of leaf area with the fruit which each rod is bearing. The shoots will now be approaching that degree of toughness which will permit of their being tied to the wires. Care must be exercised in this work at all times. It may generally be left until all thinning of the bunches has been completed.

Thinning the Berries.—This is an important branch of grape-growing under glass. The vigour of the vine under glass produces such an overcrowding of the berries of all varieties, except those producing bunches of an open character, such as the Barbarossa, West St. Peters, and others, that they would be misshapen or small were they not very much reduced in number. The result of this operation is a very different question compared with the idea that the reduction of foliage tends to the production of larger fruit. If all the fruit were taken away it would not injure the vine in the least. That could not be said of the foliage.

In thinning Black Hamburgh quite two-thirds of the berries can be taken off; Muscat Hamburgh, Alicante, Lady Downes, and Madresfield Court not quite so many. Bunches of Gros Colman want thinning well, and are improved by removing the shoulders. This assists in preventing a tendency to shank. Barbarossa, West St. Peters, Muscat of Alexandria, and Golden Queen all grow large loose-shaped bunches, and in most cases are the better for having 3 in. to 4 in. of the point of the bunches taken off. Other than that very little thinning or trimming is required.

The operation of thinning is very simple, but it requires considerable practice for the grower to become expert. Do not leave the thinning out until the berries have grown as large as small marbles, or from a quarter to a third of an inch in diameter, because it cannot then be seen so well how to proceed. Before it reaches that stage the bunch is more open: it is then easier to follow up the little groups or clusters. There is also less chance of injuring the berries that are left. A very slight bruise is soon shown on the young fruit, and becomes a permanent disfigurement. Commence at the point of the bunch and work upward, selecting first any useless or unfertilized berries, then the weakest-looking in each cluster. The best time for doing this work is in the cool hours of the morning or evening. Proper scissors can be purchased.

Ventilation must now be watched carefully, not only to regulate the temperature, but to prevent sun-scald. This occurs sometimes after a spell of cloudy, wet weather, but is prevented by keeping the house cooler for a short time on the return of sunny days.

THE FARM GARDEN.

W. H. Taylor.

The Time to plant.

Success in gardening depends largely on working on sure lines. Haphazard ways are a lottery, and subject to the same risks as a lottery. Young's aphorism about procrastination is particularly applicable to the pursuit of gardening. Leaving for to-morrow a thing that should be done to-day may well be to lose the opportunity of seizing the right time, for one never can tell what to-morrow may bring forth. The time to do a thing is the right time, not before or after. A great mistake that many make is trying to be early. In most cases there is no lottery chance in this: it is nearly always foredoomed to failure. Yet every season we find people who will do it. Subtropical things are sown or put out while the soil and atmosphere are under little better than winter conditions. Some, again, work in the reverse way. They begin to sow or plant when others are gathering the crop. I believe there are more people who err in this direction than in the former. The plan of planting a crop late because all available ground was occupied at the proper time has at least some excuse, but the crop should be suited to the time, as the time cannot be altered. It is quite useless to plant *broccoli*, *Brussels sprouts*, or even *cabbages* in March and April, as I have seen advised. At that time, however, a crop of turnips would be perfect in quality. I have intentionally planted cabbage and broccoli in mid-February, but they never made plants. Broccoli will head at the same time as those planted at the proper time, from the middle of December to the same time in January, but they are usually too small to be of any use. Similarly, *celery*, though it makes its best growth after the turn of days when conditions are becoming cooler, will not develop at all if not planted until that time. The reason for this is that some growth must have been put on before or there will not be a sufficiently long duration of growing temperature to bring it to maturity. These remarks are made because of the constant necessity that arises for explaining the evils of the too early and too late methods that are so common.

VEGETABLE-CULTURE.

The main crop of *parsnips* and *carrots* may now be put in. It has been explained before why these roots should not be sown on land freshly manured with animal manure. A patch that was well manured last season will suit them admirably and no further manure will be required; but if the quantity of manure applied were not very great, some addition is advisable. Similarly, if sown on land recently under grass, some fertilizer may be required. The quality of the soil and its former use should be the guide in this matter. Where cattle have constantly grazed little will be required, though a light dressing of superphosphate is seldom wrongly given. An application of 2 cwt. to 3 cwt. per acre is sufficient. Both parsnip-seed and carrot-seed should be sown thinly. The condition of the soil should, however, be considered. Where the tilth is good and there is no danger of the surface binding, sow as thinly as possible. The roots will require to stand about 4 in. apart, so the seed should be distributed evenly. The fewer superfluous plants there are the less will be the labour of thinning, and, what is perhaps of even greater importance, the less will be the danger in neglecting to thin in time. If the soil be unkind in character it is best to sow thickly. It is beyond doubt that seed sown thickly will come perfectly in unkind soil, where if sown thinly it might not come at all. The united efforts of a number of young will break a crust that would stifle a few plants. This I have proved repeatedly. The depth to sow seed is a matter of greater importance than frequently is attached to it. The importance of not sowing too deep has been pointed out before. Briefly, the reason is that if too far from the surface, the seedling is exhausted before it begins to absorb food from the soil. It cannot do this until its leaves are exposed to the atmosphere, but it may easily be not deep enough. They should be covered.

Recently I discovered a person who sows *onion-seed* without a drill, merely pressing the seed on to the surface. The result is very sparse rows, the germs of the seeds perishing from sun and wind. The amount of attention required after the seedlings appear depends largely on the character of the soil. Where the surface is inclined to bind it should be loosened as often as is necessary to prevent this. As a matter of fact, I find it necessary to loosen the soil on onion-beds even before the plants are through. If I did not do so I would get very few onions, because my harsh soil will not keep open long enough to let the seedlings through.

Turnips should be sown about every eight weeks. Where birds are troublesome some protection is required. Birds often pull up

the seedlings as soon as they show, and eat the germ, which at that time is sweet. The seed is not often interfered with, but it is a good plan to roll it in red lead moistened slightly with water, or, better still, immerse it for an hour or so in turpentine. The taint left in the ground is some protection to the young seedlings. A light dusting with hellebore powder is sufficient protection to the seedlings.

Radish seed should be rolled in red lead to protect them from birds, which are very partial to them. Radishes should be sown twice a month.

Seed of *broccoli* and *Brussels sprouts* should be up before this. If not sown, get the seed in at once. Both require a long period of growth to prove satisfactory.

Savoy seed may be sown now.

A late-summer crop of *cabbages* and *cauliflowers* may be secured by sowing seed at once. Cauliflowers will require well-manured soil at the time of year when their growth will be made. Growth should be rapid, or stunted plants and small heads will result. The variety used must be an early one of the Early London type. It may be remarked that, if a giant kind has been already sown as advised, there will be no use for the sowing now mentioned, as an early sort sown now will come in at the same time as the giant kind sown earlier—viz., about Easter-time.

Peas should be sown fortnightly.

French beans are now to be regularly sown. If properly gathered—that is, none being allowed to get old—each crop should last from four to five weeks. Therefore, if sufficient be put in each time, a sowing once a month will suffice.

Runner beans should be in by now. If not, plant them at once. Plant in rich soil in alternate rows, so that the seeds are about 6 in. apart.

Vegetable marrows, pumpkins, cucumbers, and various kinds of *melon* may be sown in the open ground at once in northern districts; early in November in other parts. Though these plants do not require a lot of rich manure, moisture-holding humus is a necessity. Where requirements are small they do very well indeed on heaps of garden rubbish and manure heaps, thus converting an otherwise unsightly heap into a thing of some beauty. A few spits of soil should be thrown on the heap to receive the seed. It has been noticed that though these plants luxuriate on a heap of stable manure, the roots do not penetrate far, merely running over the surface in the rainwashed and aerated portion.

Lettuce.—Sow in lines, and thin the plants.

SMALL FRUIT.

"A stitch in time saves nine." The gross basal shoots that spring so persistently from bushes of *gooseberries* and *currants*, particularly those that have been hard-pruned, are very troublesome when allowed to extend. They crowd the bushes, excluding light and air from the fruiting-wood, and are a nuisance generally by being constantly in the way and robbing the bushes of energy. They are quite easily rubbed off while they are but a few inches long, and when so treated they are done with for all time. This should be done.

Red and *white currants* should be relieved of surplus shoots in the manner indicated above, and, in addition, all side shoots should be pinched when they are 6 in. long. Though these shoots should be cut back to short spurs next winter, this must on no account be done now. The pinched shoots will break again. If shortened too much now, the basal buds would break into shoots. This must be avoided, because we look to convert them into fruit-spurs.

Black Currants.—The shoots of these should be allowed to extend, but if there be so many strong stool shoots as threaten to crowd the bush, pull the surplus out.

Plant *Cape gooseberries* in all parts. If there be still some danger from frost, it will be better to risk it rather than be too late; otherwise the plants will not have time to grow large enough to produce a good crop.

Raspberries.—Check suckers before they become woody; they are easily cut off while young. Small plantations will be benefited largely by a mulch of strawy manure, which will retain moisture and keep down weeds. Large plantations cannot be so treated, and frequent cultivation should be resorted to.

FLOWER-CULTURE.

Dahlias are now in growth. Those that were divided and bedded in to start should now be planted. Old clumps that were not taken up may be lifted and divided. One strong shoot is sufficient to make a plant, but it is not imperative to restrict them to such narrow dimensions, unless the flowers be required to assume show form. In any case, where they break up freely and they are not lifted, a number of the growths should be chopped off. The treatment which dahlias require in the way of feeding depends largely on the character of the soil and other circumstances. Usually it is a good plan to dig a good hole, two spits deep, where a tuber is to be planted, and half fill it with strong stable manure.

The roots reach this during the summer, and are thereby fortified against drought.

Chrysanthemums should now be planted in ground that has been undergoing preparation for them. Good-quality flowers can be assured only by giving them a patch to themselves, and that properly prepared as before advised.

All kinds of bedding-plants that were raised early will be fit for planting out during the next few weeks. It may be desirable to prepare a later lot to fill places now occupied by *anemones, wall-flowers*, &c., which will not be past for some time yet. There is still time to do so. Last season we sowed *nemesias, asters*, &c., at the end of October. The plants were ready to put out before the end of December, and filled their places admirably. Where ground is vacant, and plants for filling it have not been provided, all the half-hardy annuals, asters, &c., may be sown in the open ground. The surface soil should be carefully prepared, adding some light compost, if required. Some seeds that do not germinate too freely, or those of choice description, or those where the seeds being few require extra care, may be made more certain of success by simple means. Four pegs of wood may be driven in to the same level in such a position that a sheet of glass laid on them will cover the seed, holding the glass about 4 in. from the surface of the soil. The glass should be shaded with a thin film of paint or whiting. The glass will protect the seed-patch from heavy rain, and will also afford some protection from hot sunshine until the seedlings strengthen. Any person of intelligence will devise means to prevent the glass being blown off. A good way to effect this is with lengths of fencing-wire, 2 in. of the top being bent to a right angle. Several pieces may be thrust in the ground, so that the bent parts clasp the glass.

I think there is no more useful flower than the *anemone*. Started right, it flowers from late summer to early summer again, eight or nine months out of the twelve. The way to get early flowers is by sowing seed in October in the place where they are to flower. The seed is started at a time when the old tubers are still active. Consequently they are making growth before the old ones go to rest, and, if the young plants be not disturbed, they will produce the earliest flowers obtainable. No special preparation of the soil is needed. It should be well dug, of a free character, and the seed just barely covered. It is not advisable to water the soil to help the seed up. To do so may cause failure. Nor should it be necessary at this time of the year; and herein lies the great secret of success—sow in time. Later on the soil will be drier and the seed may not come freely.

THE POULTRY INDUSTRY.

F. C. Brown.

Incubation.

Several correspondents have had trouble with their incubators in the eggs failing to hatch at the right time, not pipping till the twenty-first and twenty-second day, with consequent disappointing results. There is, of course, a reason for this, and a rather common one. The correct temperature has not been maintained in the incubator, though the operator is often unaware of the fact. The trouble has been that the thermometer has not been placed in the correct position, and therefore, though it may be registering the right degree of heat, the eggs have been at quite a different degree. If the heat of the eggs is to be registered correctly the thermometer must practically rest on them, so close, in fact, that the bulb rests either on the eggs or is in the space between them. If the thermometer be 1 in. or more above the eggs, and therefore nearer the main source of heat, it must be registering a different degree from that which the eggs are receiving. Say the bulb of the thermometer is from 1 in. to 1½ in. above the eggs, it would require to register 104° to 105° to make sure of the eggs having the desired temperature. It is the position of the thermometer which is responsible for the success sometimes claimed by those who work at higher temperatures. I have heard men declare that they have never had the thermometer below 105° and they have always had good hatches, but I am confident they never had the thermometer in the correct position. Of course, an incorrect temperature may be secured by the reverse position—the thermometer being too far below the level of the top of the eggs. Remember, when the correct degree of heat is spoken of it means the temperature required by the germ of the egg, and this is always located at the top of the egg, irrespective of the position in which the egg is resting, the germ always floating uppermost. The turning of the egg is merely the turning of the shell, the position of the contents remains the same. The bulb of the thermometer should as near as possible be on a level with the germ inside the shell.

If the breeding-stock are all right, the eggs fairly fresh, the thermometer kept on a level with the germs, and the hatch hangs fire, it is well to have the thermometer tested, or a new one secured.

I have always followed the rule of using a suspended thermometer (in the centre of the machine), and having this swinging loose and in such a position that the bulb lies close between the tops of two eggs. If this procedure be followed, and the eggs commence to pip on the twentieth day and the hatch be cleaned up on the twenty-first, it may be taken for granted that the thermometer is correct and the correct degree of temperature has been maintained. I have always found that really good hatches are obtained only when all the hatchable eggs pip and hatch about the due time, and when all the available chicks are out of the shell on the twenty-first day.

Handling the Chicks.

It is one thing to hatch a chick and another thing to rear it. Indeed, the most common mistake in poultry-keeping is in thinking that the special attention necessary in incubating and brooding may be dispensed with altogether when the chicken is old enough to leave the brooder. Artificially reared stock of all descriptions demand some special attention right up to maturity, and fowls are no exception to this rule. Especially is this care necessary when the chickens have been put out of the brooder before the desired time, to make room for a fresh batch from the incubator. Hardening off should not commence before the chickens are three weeks old, and then it should be a gradual process, the chickens seldom being sufficiently well developed to be put into a colony house before they are six weeks of age. The nature of the weather has an important bearing on this question, as changing the quarters of chickens should never be done when the climatic conditions are unfavourable.

Where no special accommodation is provided for the chickens after they leave the brooder they are very liable to be affected by the change. They will huddle together in the corners, each one trying to get an inside position, which is necessarily the warmest, and instead of the chickens resting they are constantly on the move. If the huddling is at all severe a sweated condition is set up, and this, fatal to chickens at any time, is particularly severe in its consequences when close supervision (easily provided in the brooder-house) is impossible, as is the case when the young ones are scattered over the farm in colony houses. There should be, when at all possible, a half-way place between the brooder and the colony house—preferably a simply constructed hover in the latter, away from the walls, under which the chickens will be induced to shelter rather than to huddle in the corners. An experienced man can tell on the first glance in the morning if the young ones have had an uncomfortable night.

By the dirty condition of their tails and backs he can see that they have been jumping on one another in the endeavour to get as near as possible to the warmth they needed but could not secure. Thousands of chickens are lost every season by reason of huddling in corners, as a result of the chill experienced on being moved from a brooder to an unsuitable colony house. The successful poultryman never leaves anything to chance. He exercises a close supervision over all his stock, but particularly those in the process of development.

Managing the Chickens.

While it is not always possible to provide the room for exercise the growing bird demands, if it is to develop a sound body and a vigorous temperament, it must not be forgotten that cramped quarters are a fatal mistake. If little space for runs is available the culling of the young flock should be done as soon as possible, so that any birds which a keen eye will see are not likely to develop into desirable stock may be put into the more confined quarters preparatory to fattening for market, in order to provide as good exercising-space as possible for the stock to be retained for laying and breeding. As the birds reach maturity the necessary cockerels from which the selection for the breeding-pens may ultimately be made should be provided with the best exercising-ground they can have, at the same time seeing to it that abundant green stuff is always available for them, as well as the several other requisites to good health.

The main object of the breeder should be to rear animals in as natural a manner as possible without permitting them to be subjected to undue extremes of weather. The more high type the birds, and the better the housing and the method of feeding, the greater is the need to provide every opportunity for exercise. There is always the risk that this needed care may unconsciously develop into pampering, and the coddled bird is a menace. Fresh air and exercise will always be the fundamental requirements in raising heavy-producing stock. Shelter from wind and rain, abundance of sunshine, and good feeding are of great importance, but without fresh air and exercise fowls will become like hothouse plants, susceptible to the slightest check in development or laying-capacity, and a prey to the first disease that happens along. The modern bird is an artificial product, but, if she is to be bred to the profitable standard to which human wit and experience have brought her, the demands of nature must be observed.

Already I have received complaints of young birds developing a weakness in the legs, and in each case the cause has been too close

confinement accompanied by very liberal treatment—a close analogy to the hothouse plant: a rapid development, but lacking in substance. The more high type the animal, the greater is the need to provide against the weakening influences of close confinement and lack of exercise.

Foolish Sentiment.

Repeatedly I am coming across cases of mistaken sentiment—rearing chickens having some bodily defect. The worst instance I have seen was that of a bird reared to maturity having an overlapping beak. It could never have proved profitable as a layer, and was not worth the potting when it was killed. Apart from the fact that such a bird cannot obtain its proper supply of food, the malformed beak prevents it keeping that wise provision of nature—the little oil-well at the root of the tail—clean and in working-condition. The well dries up and becomes a home for insect-life, while instead of being able to obtain oil for pluming herself, and being also unable to use her beak in picking insects off her body, the bird becomes a prey to parasitic life, not only living in a constant state of torture, but spreading vermin wherever she goes. When such a bird reaches the poulterer it is always the last one to be plucked, and then the plucking is done as rapidly as possible, as it is a foregone conclusion that the carcase will be alive with insect-life. The head of such a bird is herewith illustrated.

Bedding in Brooder.

In writing in last month's issue against sand as a covering for the floor of brooders Mr. Cussen, overseer of the poultry plant of the Ruakura Farm of Instruction, was referring to the particular sand available in many parts of the Waikato—a sand containing a large percentage of glittering mineral particles which the chickens pick out. These accumulate in the gizzard and rapidly bring about death. There is no objection, however, to ordinary clean dry sand. In referring to sawdust Mr. Cussen rightly condemned the usual sawmill sawdust. Good results have, however, been obtained at the Department's Milton station from good cabinetmakers' sawdust used in a thoroughly dry condition.

Chill in Chickens.

This problem is one of the most important the poultryman has to face, for upon its prevention the successful rearing of new stock mainly depends. The effect of a chill on chickens, which frequently results in death, is too often confused with some unknown disease, especially when the mortality is very heavy. It frequently happens that a good healthy batch when taken from the incubator has the appearance of all that could be desired, but within a few days, probably the eighth to the tenth, the little ones are seen to be losing their sprightliness. The wings droop, the bowels are loose, the chickens show little or no inclination to eat, they have probably an excessive thirst, and are inclined to huddle. If this condition continues death results, and not improbably almost entire extermination takes place. Repeatedly I have been called in to discover the cause of this heavy mortality, the common idea being that it is some mysterious trouble over which the owner has no control. There is nothing mysterious about it. The cause is mismanagement—the temperature of the brooder either not being maintained at a uniform degree, or the chickens being allowed too much freedom for the first few days. There is a tendency on the part of many people at the present time to reduce the brooder-heat if the weather is at all favourable, quite forgetting that in the early hours of the morning the temperature is generally at its lowest, and it is at this time that the chill, to which so many ills in chicken life are due, commences. It is not uncommon for people to conclude that because the chickens look well on the day following a cold night that the cold has not affected them, and that, consequently, they do not require any more heat the following night. This is a common error. The chickens will probably have been affected, but will not show the effect till two or three days. It is well to reduce the artificial heat on a warm day, but it is never safe to reduce it at night, even if the night is considered to be warmer than usual. If the temperature is a little warm for the chickens, and the brooder is properly constructed, the chickens will naturally get away from the main volume of heat and settle down comfortably where they will have the necessary warmth; but in the early hours of the morning, when the natural temperature falls and they feel they need more warmth, they can easily move up to it; whereas if there is not this opportunity provided, they huddle, naturally sweat, and take the chill, which proves so fatal. It is absurd to say, as some believe, that chickens eight to ten days old are affected with rheumatics because they spread their legs—one of the most pronounced symptoms of chill; the huddling in the corners, especially with little bedding and a smooth floor, naturally

tends to make the chickens spread their legs and thereby weakens these delicate limbs.

Nature provides chickens with a full bread-basket when hatched. This becomes exhausted in about a week's time, and if the management has not been correct, this is the time trouble mostly commences. Therefore chickens require all the nursing and attention possible for at least the first seven days. They should be entirely closed in in the brooder for the first three days whereby they can receive sufficient ventilation without running any unnecessary risk. Then when they are allowed out, about 2 ft. square of run is ample for several days. The area of the run may be increased by degrees. At this stage a careful eye must at all times be kept on them. If the chickens are inclined to huddle in the runs it is a sure sign they have lost their bearings, and they must be put back into the hover, or otherwise trouble may be expected in about three days' time. Chickens will sometimes survive a slight chill when supplied with the very best of food, clean water, appetizing green stuff, and if absolute cleanliness is general; but at this time no risk can be taken. I have seen practically no disease in brooders in this country. All the troubles I have investigated have been the result of mismanagement.

THINGS TO REMEMBER.

The profit from fowls depends largely on the amount of attention they receive.

Market eggs in as fresh and as clean a condition as possible. Doubtful eggs often mean a sudden drop in market rates.

Keep the drinking-vessels clean and in the shade during hot weather.

It is desirable that a bird should not be more than four months old when cooped for fattening, nor a month older when marketed.

The best results cannot be obtained without some extra effort. The treatment a bird receives during chickenhood has an important influence on its after-life.

Vermin is an enemy that must be fought. It is often the forerunner of disease and of heavy mortality. It is more sensible to buy a tin of disinfectant powder to free the sitting hen of vermin than to run the risk of her leaving a valuable sitting of eggs. It is not generally realized that feather-pulling is caused mostly by the birds being infested with vermin.

THE FRUIT CROP.

THE officers of the Orchards, Gardens, and Apiaries Division report as follows on the conditions of the fruit crop at the end of September :—

WHANGAREI.—Apples : Good show of blossom. Lemons : Looking well. Nectarines and peaches : Set very heavily. Pears : Medium to heavy. Plums (English and Japanese) : Medium to light. Strawberries : Medium. Loquats : Heavy. Peaches and nectarines have set heavily, and there is a very fair prospect of a good crop of both apples and pears. Loquats are now on the market. The season is quite two weeks ahead of that of last year, and up to the present there have been few or no bad winds since the bursting of the buds.—*J. W. Collard.*

AUCKLAND NORTH.—Apples : Very heavy bloom. Cherries : Promise well. Lemons : Looking well. Nectarines : Promise good crop. Peaches : Fruit setting well. Pears : Very heavy bloom. Plums (Japanese and English) : Promise well. Strawberries : Plants feeling effect of recent dry weather, but still promise fair crop. Tomatoes : House crops looking well.—*W. C. Thompson.*

AUCKLAND SOUTH.—For the most part this month has been very dry. At Thames during the latter part of last month and beginning of this, light showers were consistently falling whilst apricots, peaches, and nectarines were in blossom. The weather interfered with the bees in their work, and no doubt the pollen was not in such a dry state as required, and would not be carried about by the wind and bees. This, I think, has been the cause of the patchy setting of the fruits. In the Thames district there is a light to good crop of apricots. Peaches and nectarines will be good. Plums, especially Japanese, and cherry-plums seem to be light. In some parts the Japanese plums were cut badly by the frost. The Beurre Diel variety of pears have set well. Other early blossoming varieties have a heavy crop, but where spraying has not been carried out the scab is causing a considerable number to fall. Early-blossoming varieties of apples have set well, and there will be a heavy blossoming of late varieties. Taking the district on the whole, there is every prospect of a plentiful supply of fruit. Tomatoes are looking well ; the ground, being warm, could do with a good shower. Strawberries are badly off for rain, and are ripening prematurely.—*N. R. Pierce.*

HAMILTON.—Apples : Trees blossoming freely ; indications for a fairly heavy crop. Apricots : Very light show of bloom. Cherries : Blooming profusely. Gooseberries : Fruit setting well ; crop will probably be much lighter than last year. Lemons : Still in fair supply. Nectarines : Fruit has set very well. Peaches : Setting well ; a fairly abundant crop may be expected. Pears : Showing a wealth of bloom ; slight injury to buds by frost in some localities. Plums : Trees blooming freely. Plums (Japanese) : Trees have blossomed well throughout the district. Late frosts have caused considerable injury in many localities.—*T. E. Rodda.*

POVERTY BAY.—Apples : Too early yet ; buds looking well. Apricots : From reports received prospects poor. Gooseberries : Good. Lemons : Poor. Nectarines : Medium. Peaches : Fairly good. Pears : Very heavy show of blossom. Plums (English) : Fair. Plums (Japanese) : Fairly good. September has been very dry ; consequently everything is very forward.—*W. R. L. Williams.*

MANAWATU AND WAIRARAPA.—Apples : All varieties looking well, and there is promise of a heavy crop. Apricots : Frost about the middle of month did considerable damage in some parts of Wairarapa. Cherries : Looking very well ; all appearances of a record crop. Gooseberries : Indications of a good crop. Nectarines and peaches : Looking better than they have done for years ; great quantity of blossom setting ; weather-conditions have been splendid for these fruits. Pears : Showing exceptionally heavy crop at present, although it is a little early to express an opinion. Plums (Japanese and English) : Set well, and good crops of both varieties may be expected. Tomatoes : Large quantity now being planted all through district.—*G. Stratford.*

Wanganui.—Apples: Early-flowering varieties blossoming profusely. Apricots: Have set well for this district. Cherries: Are setting well. Gooseberries: A good crop maturing rapidly. Nectarines: Have blossomed and set well. Pears: Early-flowering varieties (where in bearing) have set heavy crops; others displaying a good show of blossom. Plums (English): Harvest moderate to well. Plums (Japanese): A good crop has set. Strawberries: Plantations have been cleaned up and are making good progress. Tomatoes: A good stock of young plants still under cover. The early season continues unbroken by frost, wind, or heavy rain, with occasional good summer showers.—*W. C. Hyde.*

Hastings.—Apples: Blossoming very well; every appearance of a heavy crop. Apricots: A good setting of fruit; in parts crop mainly destroyed by frost on the night of the 12th instant. Cherries: Blossoming well. Gooseberries: Very fair. Nectarines and peaches: The late varieties of these fruits on the low-lying parts suffered rather badly by the frost on the 12th instant; otherwise a much better setting than was anticipated. Pears: Blooming and setting heavily. Plums (English): Looking fairly well. Plums (Japanese): Setting heavily; slight damage from frost.—*J. A. Campbell.*

Wellington.—Apples: Indications of a good crop of early varieties. Apricots: Very poor show of bloom. Cherries: Fair. Gooseberries: Good signs of a large crop. Nectarines: Setting well. Peaches: Fair show of blossom. Pears: I anticipate a good show of blossom on later varieties. Plums (English): Fair indications. Plums (Japanese): Good, and setting well; several growers troubled with "bladder plum." Raspberries: Rods look well. Tomatoes: Hothouse plants look well; considerable annoyance caused by the green aphis.—*T. C. Webb.*

Nelson.—Apples: Now coming into bloom, of which there is abundance. Apricots: Looking well. Cherries: Mostly in full bloom. Gooseberries: Getting well forward. Nectarines and peaches: Setting very well; a little aphis and curl making its appearance. Pears: Setting well; black-spot already in evidence. Plums (English): In full bloom. Plums (Japanese): Now setting fruit. Raspberries: Well forward. Strawberries: Have made good progress this month, and promise well. Tomatoes: Very few as yet planted out-of-doors. Fine weather has prevailed during the month, rainfall very light, and almost an entire absence of frost. Stone fruits are setting well, with promise of a good crop. Red spider is on the move. From present observations I am afraid that winter strength of lime-sulphur is not going to be as successful in controlling this pest as the oil sprays. Spraying for black-spot is general just now. Growers doing their utmost this season to control this, the worst fungus disease we have to contend with.—*J. H. Thorp.*

Blenheim.—Apples: There are prospects of a very heavy crop, as most of the trees are full of bloom. A small supply of local apples still coming into the marts. Apricots: Fruit setting well; good prospects of a record crop. Cherries: Looking healthy, and full of bloom. Gooseberries: Fruit setting well. Lemons: Good crop; still gathering a few. Nectarines: Setting well; if late frosts do not come along and cut fruit off, can expect good crop. Peaches: Setting well. Pears: A few early varieties setting well, others full of bloom. Plums (English): Excellent show of bloom. Plums (Japanese): Setting well; likely to be very heavy crops.—*B. G. Goodwin.*

North Canterbury and West Coast.—Apples: Still holding out well. Pears: Almost over. Fruit-trees generally are looking exceptionally well. Almost all varieties blooming freely. On the evening of the 11th snow began to fall in the Amuri districts, and towards morning a severe frost set in, doing a great deal of harm to fruit-trees, especially stone-fruit. The damage was so severe that I doubt if some of the plum-trees will recover. Weeping-willows were also severely dealt with, appearing at the present time as if they had been scorched by fire.—*W. J. Courtier.*

Christchurch and Suburbs.—Apples: Every promise of a good crop if favourable weather continues. Apricots: Crop damaged by frost. Cherries: Promising well. Gooseberries: Setting very freely. Nectarines and peaches: In exposed situations considerably damaged by frost. Pears: Early varieties setting well. Plums (English): Promise of good crop. Plums (Japanese): Much damaged by frost. Tomatoes: Coming away nicely in hothouse; first truss setting well; indoor planting about finished.—*Gordon Esam.*

TIMARU.—Apples: Have just commenced blooming; too early to venture an opinion on crop prospects. Powdery mildew is in evidence. Growers have been advised to get busy with Bordeaux, using the summer formula. Apricots: Showing a good setting. Severe frost in Waimate district occasioned damage there to most stone-fruits. Cherries: Carrying profusion of bloom; too early to venture an opinion on crop. Bees are to be noted as being much in evidence, and it may be possible that there will be a good crop. Gooseberries: Mostly all varieties are blooming and setting really well. Red and black currants are carrying a good show of bloom, especially the black variety. Peaches: Prospective indications are for a fair average crop; this fruit has set well generally. Pears: Carrying a profusion of bloom; some varieties are setting well. The weather has been favourable for the development of fungi spores, being dull and foggy, alternating with ultra warm days. Rain fell during latter portion of month. Plums (Japanese): These fruits are not carrying a crop proportionate to the amount of blossom that was in evidence; the crop, however, will be a fair average one. Raspberries and strawberries: Growers of these berries in Waimate County have been getting busy with hoe and cultivator; bushes and plants are making good growth in consequence. Tomatoes under glass are coming on real well; isolated cases of early plants being in bloom.—*A. B. Mansfield.*

DUNEDIN.—All classes of fruit are blooming very heavily, and the weather is ideal for pollination purposes.—*W. T. Goodwin.*

MARKET CONDITION OF LOCAL FRUIT AND VEGETABLES.

THE Fruit Inspectors of the Orchards, Gardens, and Apiaries Division report as follows on the condition of locally grown fruit and vegetables in the shops and auction-rooms, and the market position of these, for the month of September:—

AUCKLAND.—Very little local fruit has been handled throughout the month. A few consignments of apples and pears came to hand ex freezer. Apples average 10s. per case, pears 10s. to 12s. Poor-man oranges range from 4s. to 7s. 6d., and local lemons 8s. to 10s.—*C. Craigie.*

WELLINGTON.—Local fruits have been very scarce during this month, and prices remain high. Several lines had to be destroyed, being badly infested with scab and scale. Prices are as follow: Apples, dessert—Rokewood, 8s. 6d. to 10s. 6d.; Sturmers, 8s. to 10s.; cooking—Washington, 8s. to 10s.; Epps's Seedling, 6s. to 8s. per case. Pears, 5s. to 8s. 6d. per half-case. Vegetables generally are in good supply. Cabbages (spring), 6s. per sack. Cauliflowers, 9s. to 10s. Green peas, 2s. 6d. to 2s. 9d. per peck. Rhubarb, 5s. to 8s. per dozen bundles. Cucumbers, 2s. 6d. to 9s. 6d. per dozen (hothouse). New potatoes, 2½d. per lb. Old potatoes, £3 10s. per ton. Onions remain firm at £10 per ton. All other vegetables are bringing satisfactory prices.—*T. C. Webb.*

CHRISTCHURCH.—Local fruit can be said to have finished, and American apples and pears taken its place. Apples, a few dessert, 8s. to 9s. Poor-man oranges, on small side, quality medium, 8s. 6d. to 10s. Cucumbers, 10s. per dozen. Rhubarb, 2s. 6d. to 3s. 6d. per dozen. Onions, in poor condition, 5s. to 6s. per cwt. Potatoes, 27s. 6d. to 30s. in paddock. Cauliflowers, oversupply, 1s. to 2s. 9d. per dozen. Other vegetables in fair supply and good demand.—*Gordon Esam.*

DUNEDIN.—A few lines of apples and pears came to hand in good order. Cucumbers were in good order and of splendid quality. There were good supplies of the following vegetables, viz.: Rhubarb, cauliflowers, cabbages, lettuce, beetroot, leeks, carrots, turnips, radishes, celery, asparagus, parsnips, and potatoes.

Prices for the month ruled as follows: Apples, 9s. to 10s. 6d. per case; pears, 6s. 2d. per case; Poor-man oranges, 6s. 6d. per case; cucumbers, 11s. to 11s. 6d. per case of 9; rhubarb, 1½d. to 3d. per lb.; cauliflowers, 2s. to 3s. per sack; cabbages, 4s. to 4s. 6d. per sack; asparagus, 10d. to 1s. 6d. per bundle; potatoes, £2 10s. to £2 15s. per ton.—*E. T. Taylor.*

INVERCARGILL.—The only local fruit on this market during September was Canterbury and Southland grown apples, and a few Auckland Poor-man oranges. All lines examined were clean. The current prices for the month are as follows: Apples—dessert, 7s. to 10s. per case; cooking—6s. to 8s. 6d. per case. Poor-man oranges, 8s. 6d. per case. Potatoes, £2 to £2 10s. per ton; on trucks at country sidings, £1 5s. to £1 10s. per ton; Up-to-date seed potatoes are bringing £2 10s. to £3 10s. per ton. Carrots, 4s. to 5s. per cwt.; parsnips, 3s. 6d. to 4s. 6d. per cwt.; swedes, 1s. 3d. to 1s. 9d. per sack; cabbages, 3s. to 3s. 6d. per sack; cauliflowers, 4s. to 5s. per sack; rhubarb, 2d. to 3d. per lb.—*R. Hutton.*

HONEY-CROP PROSPECTS.

THE Director of Orchards, Gardens, and Apiaries Division has received the following reports on the honey-crop prospects from the Apiary Instructors:—

AUCKLAND.—September has been an ideal spring month, and white clover is now becoming more plentiful. A good rainfall last week relieved the fears of a dry spring. There is every indication of a good season. Honey is in demand, but beeswax is quiet, 1s. 3d. to 1s. 4d. per pound being obtained. The top price for the Waikato shipment of honey was 46s. 6d. per hundredweight. Merchants are inquiring for all grades of honey for exporting, and prices have an upward tendency.—*G. V. Westbrooke.*

WELLINGTON.—I am pleased to say that the prospects for a good honey crop are good. In Taranaki, Wellington, and Hawke's Bay the exceptionally fine weather during the last part of September enabled the bees to gather a little nectar from willows, &c., and the few nightly showers recently experienced will have a beneficial effect on clovers and other plants. Should such weather continue there is every prospect of an excellent honey-flow.—*F. A. Jacobsen.*

CHRISTCHURCH.—The fine weather we have had recently has given beekeepers a splendid opportunity to treat stocks found to be diseased. There is a good flow of nectar from willows, laurels, kowhai, konini, matipo, and other bush vines and trees. Brood-rearing is in full swing, and stocks are strong and in a forward condition. Early swarms have been reported. Section honey is scarce, practically none offering. There is still a fair quantity of bulk honey of excellent quality, and it is being offered only in small odd lots. Honey is selling freely, and prices are firm. Now is the best time of the year to export honey to the Home market. There is only a small consignment of 2 tons forward for this month's shipment.—*L. Bowman.*

DUNEDIN.—A fortnight of fine spring weather has enabled the bees to work the willows and apple-blossom; consequently beekeepers have been able to suspend feeding-operations, usually carried on to a much later period. There is little fresh to report in market conditions. Prices are unchanged. Beeswax is scarce.—*E. A. Earp.*

The steamer "Ionic," which sailed from Wellington for London on the 2nd instant, had on board the following cargo for Monte Video: From Wellington—5 packages agricultural machinery and 50 rams; from Dunedin—1 plough and 140 sacks oats.

THE WEATHER FOR SEPTEMBER.

D. C. Bates.

Frequent westerly depressions passed in the South between the 1st and 13th of the month, on account of which very unsettled weather prevailed. Most of the rainfall occurred during this period, but except in the western districts of the South Island and in the high country no exceptionally heavy falls were recorded. On the 10th and 11th very boisterous conditions were experienced. Between the 11th and 13th barometric pressure increased, and on the 14th extremely high pressure ruled over the North Island, a condition of affairs which persisted until the close of the month.

The passage of three slight disturbances to the southward was responsible for changeable and squally conditions in parts about the 17th, 21st, and 28th, but generally during the latter half of the month fair weather was the prevailing feature, although a considerable amount of haze and cloudiness was experienced.

The west coast and portions of the southernmost districts of the South Island had an excessive rainfall, but in all other parts of the Dominion the total for the month was below normal. In the Hawke's Bay and Gisborne districts this deficiency was greatest, most stations here recording a little over half an inch, equal to only one-fifth of the average.

DISTRICT NOTES.

District. *Chiefly from Telegraphic Reports.*

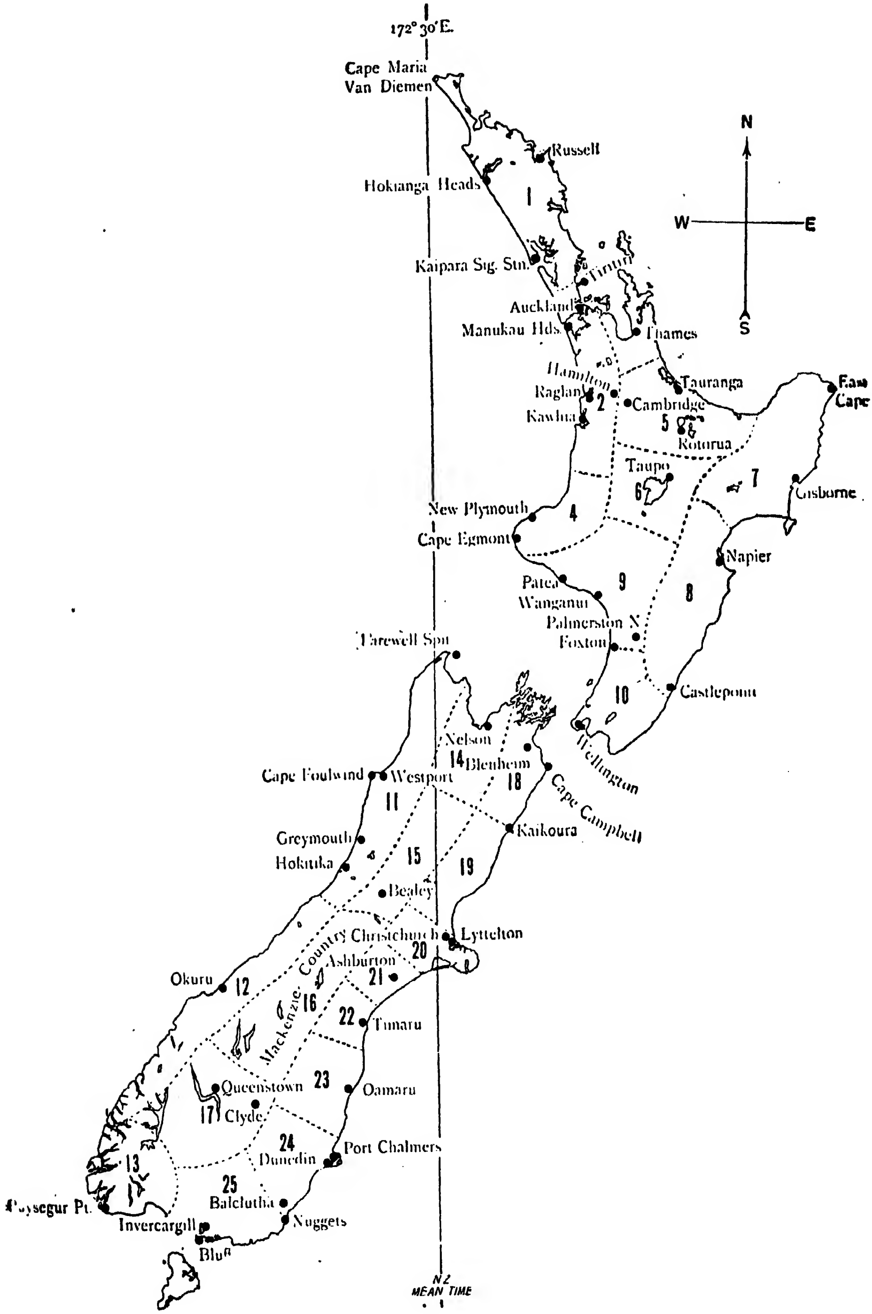
1, 2, 3. The aggregate rainfall was everywhere below the normal by about 50 per cent. From the 1st to the 12th the weather was unsettled with occasional heavy showers, but from then until the close of the month more favourable conditions ruled, cool easterly breezes predominating.

4. On the 1st and 6th some stations recorded moderately heavy rain; otherwise what little rain there was fell in the nature of showers. As showing the effect on precipitation of altitude an interesting comparison follows, giving the total rainfall on the 6th, at three different stations:—

	Height above Mean Sea-level in Feet.	Rainfall in Inches.
New Plymouth	63	0·80
Riversdale	817	2·52
Mountain House, Mount Egmont ..	3,208	6·61

The returns show a deficiency of about 35 per cent. of the average at most stations. Northerly was the prevailing wind-direction, and, except on the 6th, 11th, 17th, and 18th, the wind-force was not remarkable.

5. The month was one of fine and dry weather, the rainfall being only about one-third of the mean for September.


172° 30′ E.
Cape Maria Van Diemen
Russell
Hokianga Heads
Kaipara Sig. Stn.
Tiritiri
Auckland
Manukau Hds.
Thames
Hamilton
Tauranga
Raglan
Cambridge
Kawhia
Rotorua
East Cape
Taupo
Gisborne
New Plymouth
Cape Egmont
Napier
Patea
Wanganui
Palmerston N.
Foxton
Castlepoint
Farewell Spit
Nelson
Blenheim
Wellington
Cape Foulwind
Westport
Cape Campbell
Greymouth
Hokitika
Kaikoura
Bealey
Christchurch
Lyttelton
Mackenzie Country
Ashburton
Okuru
Timaru
Queenstown
Oamaru
Clyde
Port Chalmers
Dunedin
Puysegur Pt.
Balclutha
Invercargill
Nuggets
Bluff
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N.Z. MEAN TIME

District.

6\. The greater proportion of the rain fell on the 6th and the 11th, on which days a few of the stations measured over an inch. Fair weather was, however, the predominating feature of the month, precipitation usually taking place in the night-time. About 45 per cent. less than the average was recorded.

7, 8. As in July, these districts were again subject to unusually dry conditions, very few stations returning even 1 in. of rain for the whole month—about one-fourth, and in some cases only one-fifth, of the normal. Fine and bright weather prevailed generally, and with the exception of two or three days there was an absence of strong winds.

9\. From the 1st to the 12th unsettled and at times boisterous conditions prevailed. Most of the rain was recorded during this period, and the month's total was below the average by from 15 to 30 per cent. From the 18th to the end of the month the weather was changeable, with fair to cloudy conditions predominating.

10\. Weather similar to district No. 9, but the difference below normal rainfall was generally greater, ranging between 25 and 60 per cent.

11, 12, 13. A few stations in the extreme north of district No. 11 had slightly less than the average, but generally the west-coast districts recorded a rainfall in excess of the normal by from 10 to as much as 60 per cent. Much unsettled weather was experienced, and there were very few days on which no rain fell.

14\. Fair and mild weather prevailed except during the first week, when conditions were cold and unsettled. The rainfall was less than the average by about 40 per cent.

15\. During the first half of the month strong north-westerly winds prevailed with unsettled weather. Some heavy rains occurred on the 4th, 5th, between the 8th and 10th, and again about the 17th. Both Otira and Bealey Flat upheld their reputation of being the wettest of our recording-stations in the South Island. At the former place 31·32 in. of rain fell, and the latter measured 25·72 in. during the month. Otira had the heaviest day's fall with 5·63 in. on the 10th, while Bealey Flat had over 5 in. on both the 4th and the 10th. The total was about double the average for the month. In the latter half of the month the weather was more favourable.

16\. Until the 13th unsettled weather ruled, and on the 11th a severe thunderstorm was experienced. During the remainder of the month fair and pleasant weather prevailed, bright days, but often foggy at night. A few frosts occurred. Rainfall was below the mean by about 20 per cent. in the lower-lying country, but slightly in excess to the westward.

17\. The rainfall was generally in excess of the normal, the difference ranging from 30 to 60 per cent. Some unsettled weather prevailed in the early part of the month, but fair though somewhat cloudy and foggy conditions predominated.

18\. Sixty-five per cent. less than the average rainfall was recorded. On the night of the 10th some heavy rain fell, with a high northerly wind, but no day's fall attained 1 in. Strong northerly winds were experienced from the 1st to the 10th, with intermittent showers, but, as a whole, fine spring weather was experienced.

19–23. All the east-coast districts experienced fair and dry weather, with a rainfall averaging about 55 per cent. below normal. Cool easterly winds and fogs were frequent.

24\. A considerable amount of dull, misty, and showery weather prevailed, but the aggregate rainfall was slightly below the average (15 per cent.). A cold snap took place on the 11th. Between the 13th and 27th very little rain was recorded.

25\. About or slightly above the average rainfall was experienced, most of it occurring between the 1st and 12th, when very unsettled conditions prevailed. Between the 10th and 12th conditions were very boisterous. From the latter date to the close of the month the weather was fair, but cloudy and misty at times.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtained from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith.

Maize.

Mr. H. E. Philip, Mauku :—

Can you inform me as to which method of planting maize I can get the greatest weight of green feed from (for cows)—broadcasting and ploughing seed in, or planting in rows 2 ft. apart and scarifying between the rows ? Also kindly inform me as to the most suitable varieties for early and main crops.

The Fields and Experimental Farms Division :—

At the Ruakura Farm of Instruction the system adopted is to sow the maize in rows 27 in. apart so as to admit of horse-hoeing, and in the opinion of the Manager this system produces a maximum crop. Early Red Hogan is a good early variety, and James's Eclipse is one of the best for late feed.

Sowing Clover before planting Lucerne.

Mr. J. Butterworth, Hairini :—

Is sweet clover the best to sow before planting lucerne ? Will it inoculate the soil ? How long should it be allowed to grow before ploughing in ? What are the best varieties for the purpose ?

The Fields and Experimental Farms Division :—

Sweet clover (*Melilotus alba*) has been largely recommended as a crop to be followed by lucerne. Sweet clover should occupy the ground twelve months previous to the preparation of the ground for lucerne. No soil-inoculation is necessary when sweet clover is used. *Melilotus alba* is the best species to use. In most parts of New Zealand the preliminary cropping with sweet clover is not necessary unless the ground contain too many weeds.

Grasses.

"New-chum," Okania, Matamata :—

What grasses would be best to surface-sow on steep bank of gully, say, in the autumn ? I intend to burn the scrub, and sow with grass, as the banks cannot be ploughed. Would danthonia-grass take on light soil ? Cocksfoot does well here, but I want something to take a hold quicker than cocksfoot. If you think danthonia the most suitable, please name the most suitable variety, as I understand there are different varieties of it. In what month is it best to plant the seed ?

The Fields and Experimental Farms Division :—

It is quite possible that danthonia would prove useful on the steep bank of a gully. It is quite suitable for light soils, medium to poor quality. It takes considerable time to establish itself—much longer than does cocksfoot. The quickest grass to take hold is, of course, rye-grass ; but on steep banks, especially where

soil is light, rye will not remain permanent. *Agrostis canina*, if the soil suited it, would take hold quicker than danthonia. A mixture comprising *Danthonia pilosa*, *Agrostis canina*, some cocksfoot, Chewing's fescue, and *Poa pratensis*, and also some white clover, and a very little *Lotus corniculatus*, might prove suitable. In such gullies I have also known about 1 lb. to 2 lb. of *Paspalum dilatatum* included in the mixture, and, where such grass is not objected to and the conditions favourable, good results have been obtained. It is impossible to state the month in which to sow. It might be end of February, but more likely some time in March, according to weather-conditions.

BUDA KALE.

"DAIRY," Rawhitiroa, Taranaki :—

Can you give me any information with regard to Buda kale ? I have heard that it is a splendid forage crop for milking-cows.

1. Is it likely to taint the milk ?
2. Has the Department any seed for sale ?
3. Does it require any special manure ?
4. When is the best time to sow, and what quantity of seed to the acre ?

The Fields and Experimental Farms Division :—

Buda kale was introduced into Taranaki some twelve years ago by Mr. Gilbert Wilson, who at that time resided on the Duthie Road, and was successfully grown by him for the feeding of cattle and pigs, but especially the latter, which thrived exceedingly well on it. At Mr. Wilson's dispersal sale, about 1 ton of seed was sold in the district, and this has been grown successfully by the purchasers both as a cow and a sheep fodder. One of the best farmers in this district speaks very highly of it as a green fodder for dairy cows during the dry autumn months, and says that it beats maize and any other green fodder he has tried. This year he fed ninety cows on a 10-acre plot.

1. Buda kale and Thousand-headed kale fed to cows will not taint the milk if the cows are fed some considerable time before milking, or immediately after being milked.
2. The Department has no seed for sale.
3. 2 cwt. of superphosphate, ½ cwt. of sulphate of potash, and 1 cwt. of bone to the acre should be a good fertilizer.
4. The seed should be sown about November; 2½ lb. to the acre should be sufficient seed to sow broadcast, and 1 lb. in drills.

ENSILAGE.

"SILO," Edendale :—

Quite a lot has been written and said about the splendid feeding-value and the security felt by having a stack or two of ensilage for horses and cattle. Would you be kind enough to inform me—

1. Is it also good food for sheep ?
2. Would it pay to cut any spare feed, that could be conveniently handled, on a small run carrying sheep only ?
3. Would it be advisable to grow a maize or other suitable crop to stack, with the intention of safeguarding against a bad year ?
4. If so, how long would the fodder remain edible ?
5. Would pit ensilage not be handier for two men to work ?

The Fields and Experimental Farms Division :—

1. Ensilage is a suitable feed for sheep. White clover, for which your district is noted, makes first-class silage for sheep, provided it be cut when in full bloom and not permitted to wither in the sun.
2. I would recommend closing up an area with principally white clover and trefoils, as sheep prefer silage short and sweet.
3. Yes, it would be advisable to grow maize. If sown in December, we would suggest sowing Ninety-days or Early Clarence, with a fertilizer to force it along. It could be stacked or siloed if intended for sheep. I would also advise cutting it into short lengths.

4. Ensilage remains edible from one to four years, but it is recommended to clear up or consume some time during the second year.

5. Yes, pit, *versus* silo, would be handier for two men; add from 3 ft. to 5 ft. in depth daily, to govern the temperature—viz., 130° F.

Sample of Weed.—Spider-webs on Peaches.

Mr. D. Bawden, St. Lawrence, Otane, Hawke's Bay:—

I am forwarding a weed that has spread very fast in the garden this year, mostly in sheltered places about the hedges and currant-bushes, and I should like to know what it is?

Could you also give me a remedy for keeping spider-webs from peaches grown on walls?

The Orchards, Gardens, and Apiaries Division:—

The plant forwarded is a specimen of cleavers, or tell-tale, a common hedge-row weed of England. It is easily destroyed by cultivation.

If spiders' webs are so numerous as to cause trouble use the sulphur-bellows on the wall peaches. The dusting of sulphur drives the spiders away.

Blight on Apple.

Mr. A. S. Oliver, Mangaweka:—

Would you be kind enough to tell me what is the blight affecting this apple? What is the best spray? When is the time to use it to prevent the apples being affected?

The Orchards, Gardens, and Apiaries Division:—

The apple specimen forwarded is badly attacked by a fungus disease known as "black-spot," or "apple-scab." The trees should be sprayed as soon as the fruit has just formed with the 4-5-50 formula of the Bordeaux mixture, to which 1½ lb. of arsenate of lead can be added for the control of codlin-moth. The spraying should be continued at intervals of about fourteen days, if necessary.

Complaints of Draught Mare.

"New-chum," Okanja, Matamata:—

Which is the best way to treat a heavy draught mare for the following complaints:—

1. I have noticed on one or two occasions that she has passed worms about 3 in. long. She has a very good appetite, and can eat well; but I cannot work her as I should like to, as she seems so weak. I may say that she had a foal last October, and got down in condition while suckling it. However, it has been weaned for the last four months. I am now feeding the mare on beans and chaff, with oats added; but at the same time I do not seem able to get her up into condition. The age of the mare is about ten years.

2. I also notice when I work the mare a bit hard that she passes a white fluid from the vagina or water-passage. Would that keep her down in condition? What would you suggest to do for it?

3. I also see that she has some lice on her: what will be the best way to get rid of them?

4. Can you suggest a good condition-powder for a horse that is hide-bound?

The Live-stock and Meat Division:—

1. The worms are apparently the common ascarides. Give her, fasting, 2 oz. of oil of turpentine in a pint of raw linseed-oil. It may be necessary to repeat the dose in a week's time. Give the mare 2 lb. per day of ground oil-cake with her other feed.

2. The discharge you mention is due to a chronic inflammation of the glands in the mucous membrane of the vagina or womb, or probably both, and is due to something which occurred at her last foaling. This condition is known as leucorrhœa, and commonly termed "whites." It may have something to do with

her being in poor condition, although this is not usually the case. Irrigate the vagina, and, if possible, the uterus (using the tubing and funnel as recommended in the treatment of abortion) with a lukewarm solution of bicarbonate of soda, three teaspoonfuls to the pint of water. The parts should be flushed thoroughly. Next day irrigate her with a solution of alum, two teaspoonfuls to the pint. Continue this alum solution every other day for a week; then wait a week, and if she is not right, repeat. If she is still affected at the end of this period, write again.

3. Lice can be killed by dressing with any of the coal-tar sheep-dips, the same strength as for sheep. Choose a fine day, and thoroughly dress the mare all over, using a stiff brush. This will kill the lice, but will not kill the eggs, which hatch out in seven or eight days, when the mare must again be dressed. It may be necessary to give her a third dressing.

4. It all depends upon the cause of the horse being "hide-bound." If it is your mare you are thinking of, give her the following: Dried sulphate of iron 4 drams, powdered nux vomica 3 drams, and 2 oz. each of bicarbonate of soda, powdered aniseeds, and gentian. Divide into six powders, and give her one every night in her food.

Birch-bush Land.

Mr. V. G. Rockell, Maruia :—

1. What effect, if any, has tannic acid on land? And does land on which birch bush grows become impregnated with tannic acid?

2. What is the best kind of danthonia to sow on birch land? How much seed, sown by itself, would be a good seeding? Would Chewing's fescue be likely to succeed if sown with danthonia?

I might mention that my bush land is rather poor, and strong in places, and the bush is just about pure birch. The altitude runs from 1,200 ft. to 1,800 ft., and though cocksfoot, rye, and clover seem to take fairly well on a burn, I think it is almost certain to run to fern if nothing else were sown. I omitted to say that a good deal of the land is mossy.

The Director of the Fields and Experimental Farms Division :—

1. No experiments have yet been conducted to ascertain what organic compounds are present in New Zealand virgin soils, neither has the effect of tannic acid on New Zealand soils yet been ascertained.

2. *Danthonia pilosa* is the best species to sow on birch country. There is a prevalent idea that *Danthonia pilosa* seed is very light, but this is quite erroneous. The number of seeds per pound of *Danthonia pilosa* is approximately 550,000, or the same as for cocksfoot. When it is considered that on ordinary bush burns it is customary to sow over ten million seeds per acre, it will be seen that it will take 18 lb. of *Danthonia pilosa* to make up that number. Were the seed of danthonia cheap I would advise sowing at that rate when no other varieties of grasses were used. The price, however, precludes the sowing of this grass at that rate on inferior country, but I should advise at least 9 lb. per acre. I do not like the mixing of Chewing's fescue with danthonia, and would prefer fiorin, brown-top, red-top, and a little crested dogstail. The value of the fiorin, &c., lies in the fact that it yields a good deal of feed in the late summer, when the productivity of the danthonia is at its lowest point.

Tall Fescue.

Mr. J. Ovens, Ruawai :—

I want to know how tall fescue affects cattle and sheep, if it is not the ergot. I have a lot of tall fescue in the swamp and bush, and I have not seen anything wrong with the cattle, which have been on it for years.

The Live-stock and Meat Division :—

The grass itself does not affect animals. It is the ingestion of ergot fungus (*Claviceps purpurea*) which attacks the seeds of many species of the grass family which causes the mischief. This fungus is usually found on the so-called tall fescue, but in other parts rye and other grasses are affected, and we have seen it on the toitoi. Probably ergot has not yet reached your district, for which you may be thankful. If the ergot fungus is not there it cannot affect any grass.

Onions.—Gooseberries.

T. S., Te Aweawe Street, Palmerston North :—

Can you recommend some form of spray for blight on onions ? What manure is good for a top-dressing to stimulate their growth ?

What mixture is the best for spraying gooseberries ? Mine have not been sprayed ; they are only a young plantation.

The Orchards, Gardens, and Apiaries Division :—

The blight which affects your onions is no doubt onion-mildew (*Peronospora schleideni*). This disease can be warded off by timely spraying with the 4-4-40 formula of the Bordeaux mixture. A mixture of blood and bone fertilizer applied as a top-dressing at the rate of about 2 cwt. to the acre would stimulate the growth.

It is advisable to spray gooseberries during the winter with the 10-10-40 formula of the Bordeaux mixture to protect then against attacks of leaf-spot. If, however, they are at present in leaf the weaker formula should be used—4-5-50.

Disease of Leaf.

"Subscriber," Makauri, Gisborne :—

Would you be kind enough to tell me what is the disease of the leaf forwarded herewith ; and also the best remedy for it ?

The Orchards, Gardens, and Apiaries Division :—

The leaf-specimen forwarded is attacked by the large black scale (*Aspidiotus Rossi*). The best means of controlling this scale in such a climate as is experienced in the Gisborne district is by means of the natural enemy, the steel-blue ladybird. A small colony of these will be forwarded you when they are available, about January next.

Disease in Japanese-plum Trees.

Mr. W. Sutherland, Te Pare, Featherston :—

I am forwarding specimens from Japanese-plum trees, and would like you to let me know the cause, &c., of the disease. The trees seem quite healthy, but grew very little fruit last season, although they had a great show of bloom. This year the show of partly formed fruit seems much greater, although there is a large quantity of fruit of abnormal growth.

The Orchards, Gardens, and Apiaries Division :—

The Japanese-plum specimens are attacked by a disease known as "bladder-plums," "pocket-plums," &c. It is caused by a minute fungus that lives parasitically in the tissues of the young branches. In the spring, just as the trees are beginning to blossom, part of the mycelium of the fungus extends from the interior of the branches and enters the young ovaries of the flower. It then permeates through the developing fruit and prevents the formation of the stone, and instead of developing into normal plums the fruit becomes deformed and hollow. Plums of the Japanese variety are especially liable to attacks of this disease. In order to control this fungus the trees should be thoroughly sprayed in the early spring, just as the buds are beginning to swell, with the 10-10-40 formula of the Bordeaux mixture.

Grass-seed for Sandy Soil.—Sickness of Draught Filly.

"Ocean View," Fortrose, Southland :—

1. What would be a good mixture of grass-seed to sow on a piece of sandy soil which will not hold the usual mixture sown in this district more than two or three years—viz., perennial rye, Italian, cocksfoot, and clovers ? This land lies at the foot of good sloping ridges of good quality, is on the banks of a small river, but does not flood, and is about a mile from the coast. It grows good crops of turnips, but is a bit hard to ridge up owing to being low hills and hollows, and the wind is bad for blowing the sand when ridged, especially on the hillocks. I see kidney vetch recommended for sandy soils : would it suit down here ? What other grasses would you recommend ?

2. I have a draught filly coming two years old, which was very bad with navel ill when a foal, and which we never expected to live. It was very much swollen in both stifle-joints, so much so that it could hardly walk, and when lying down could hardly get up. It used to make a cracking sound in the joints when it moved quickly, but during the last six months especially the swellings have gone down till they are now not much more than half the size, and the cracking sounds are only heard occasionally when she gallops. She has always been in rather low condition, though on good grass, but is now putting on much more flesh, and is very well grown for age. Is she ever likely to be worth anything for working, and if bred from would her stock be healthy, or inclined to take the same trouble ?

The Fields and Experimental Farms Division :—

1. A mixture of the following might be found suitable, as they are deep-rooting : Tall oat-grass, tall fescue, crested dogstail, sheep's burnet, chicory, rib-grass, meadow fescue, Chewing's fescue, *Poa pratensis*. Cocksfoot should hold in conjunction with the foregoing. Prairie-grass should be sown to take the place of rye. It would stop the sand blowing until the more permanent grasses are established. If the wind is especially troublesome the need of a shelter-belt to protect the land is obvious. *Pinus insignis* is, of course, the best tree for lands comparatively near the sea.

The Live-stock and Meat Division :—

2. Cases of actual recovery in these cases of navel ill or joint evil are very rare, and some chronic changes in one or more organs are almost sure to have taken place. In the case of your filly these are apparently in connection with the cartilages in the stifle-joint, although there may be other changes in connection with serous membranes, such as the pleura and peritoneum, which you are not aware of. It is doubtful whether she will ever be fit for work, but if she matures properly and there has been no serious structural interference with the uterus or ovaries, there is no reason why she should not breed and her produce be healthy. Joint evil is due to the accidental introduction of a micro-organism into the system through the navel after birth, and the produce of such an animal could become affected only in the same manner.

Flood-water.—Spraying Skelly.

"Subscriber," Otokia, Otago :—

1. Please inform me as to the best and most economical way of getting rid of flood-water off a low area of land (about 100 acres). What kind of pumping plant would you advise ? I understand that a good part of Holland is below sea-level : do you know what class of pumps they use there ?

2. Could you also let me know the best way, time, and material for spraying skelly (wild turnips) in a grain crop ; also if it would kill Canadian thistles ? I suppose a potato-spraying machine would do.

The Fields and Experimental Farms Division :—

1. This matter hardly comes under the scope of this Department. A civil engineer should be consulted.

2. It would be impracticable to destroy skelly in a grain crop without endangering the crop. I would suggest that pulling the wild turnips would be the quicker and more satisfactory way. There are quite a number of sprays on the market, but none of them have been proved satisfactory in the destruction of Californian thistle. Also, the cost of application per acre is frequently prohibitive.

Dairy-farming.

Mr. H. Fowler, Kimbolton :—

In boiling the rubber tubes, cups, &c., of a milking-machine I find that soda seems to affect the aluminium cups. Is there anything else you could recommend to take the place of soda ?

The Dairy-produce Division :—

The boiling of milking-machine parts in a soda solution is not recommended. It is quite sufficient to wash them in warm soda water and then to boil them in water alone. Possibly you have been using a solution a good deal too strong for the purpose. There are on the market several other cleansing-powders which are said to give just as good results as soda, but we should not care to recommend any of them in place of it.

Cultivation of various Crops.

"A Learner," Killarney, Mauku :—

Please answer the following questions as regards tares, and oats or barley, sorghum, and Hungarian millet: 1. When to sow? 2. When to reap? 3. How much per acre? 4. Can they be cut more than once? 5. Are any suitable for hay, or only green feed? 6. What is their value as feed for cows, especially during dry weather?

The Fields and Experimental Farms Division :—

Hungarian Millet.—1. November. 2. Cut immediately before flowering. 3. 20 lb. to 30 lb. per acre. 4. No. 5. Green feed. 6. Grows rapidly and yields a large supply of food.

Sorghum.—1. September to December. 2. Before stalks become woody. 3. 25 lb. to 30 lb. per acre. 4. No. 5. Green feed. 6. Produces a large supply of green feed during hot summers, and much relished by cows.

Tares and Oats or Barley.—1. March, for winter supply; October, for dry weather. 2. June or July. 3. 1½ bushels of tares, 1 bushel of oats or barley. 4. Yes. 5. Best for green feed. 6. Rapid growth and large supply of feed.

Hay for Calf-feeding.

Mr. Thomas Keane, Araimu :—

Is hay injurious to young calves? I fed mine on some, and they seemed strong and healthy for three weeks. Then five began to decline in health, and after a time they died. I opened their stomachs, and found them to be just like one hard lump, consisting of hay and milk that had curdled in the hay. I also noticed that two calves had very swollen jaws, and I have one alive now with the same swelling. Can you tell me if the hay killed the calves, and what is the cause of the swelling?

The Live-stock and Meat Division :—

Yes, it is evident that indigestion due to the hay was the cause of the trouble. In very young calves the first three compartments of the stomach are not properly developed, consequently all food goes to the fourth or true stomach without being properly masticated and prepared for digestion. We could not say what is the cause of the swollen jaws without examining the animals.

Shelter-trees.

Mr. J. Ovens, Ruawai :—

Please let me know what are the best shelter-trees to plant on partly drained kahikatea-swamp land. I want something that will not grow too high, and something the cattle will not eat, to stand on the banks of the drains on the south and west sides of the paddocks.

The Orchards, Gardens, and Apiaries Division :—

For shelter we would recommend the growing of black-wattle (*Acacia decurrens*) on your land. It is a quick grower, but should be protected from cattle till the trees have reached a fair height. This applies to all young shelter-trees, which, even if they are not eaten, get damaged by cattle trampling them down.

The wattle is best raised from seed, which should be sown in well-prepared ground where the trees are to remain permanently, as the plants are difficult to transplant satisfactorily, unless great care be taken in the operation. The following are the directions for preparing and sowing the seed: The quantity of seed required will be at the rate of ¾ lb. per acre. Overnight, from twelve to twenty-four hours before planting, pour boiling water into a vessel, and at once tip the wattle-seed into it. The steeping will cause germination to commence, and also the exudation of a certain amount of gum. The gum should be washed away, two or three changes of water probably being required to do so effectively. The seed should then be spread out to dry for, say, half an hour, care being taken that the exposure is not sufficiently long to do more than remove the moisture from the outside of the skin, and not in any way to check the germination already commenced. If there should still be any trace of stickiness left, a light sprinkling of

wood-ashes will correct it. In this condition the seed can now be drilled into the prepared land to a depth of ½ in. in two rows 6 ft. apart, with bonedust added at the rate of 1 cwt. per acre.

PET EWES AS FOSTER-MOTHERS.

"FOSTER," Kaipara Flat :—

I have been reading about a pet ewe having two lambs yearly for the last four years in succession, and also acting as foster-mother to two other lambs. Now, around most small homesteads there are one or more pet ewes in prime condition, quite capable of rearing more than their own offspring, but the difficulty is to induce them to take to a strange lamb. Can you advise the best method to adopt? It would mean the saving of many lambs. If ewes could be got to foster motherless lambs, there would not be the waste of life that now annually occurs at lambing.

The Live-stock and Meat Division :—

The only advice we can give you is to use patience. Rubbing the foster-lamb against her own lamb may be more likely to get her to take to it, as she will recognize the smell. The ewe should be tied up while the lamb sucks. The best method is to make a sort of bail by driving two strong round stakes into the ground 7 in. apart. Her head may be placed in this. Two other stakes may also be placed on each side of her to prevent her moving about. These should be far forward enough to enable the lamb to suck and get away should she try to trample on it. A sling may also be fastened to these stakes and passed under the belly of the ewe to prevent her throwing herself down. If patience is exercised you may get her to take to it, but it is doubtful if it is worth the trouble.

CRICKET-BATS MADE FROM WILLOW-TREES.

MR. S. G. DAWE, 98 Campbell Street, Wanganui :—

I have just received a letter from a well-known firm of cricket-bat makers asking me for information about the willow-trees—whether they are suitable for working up into bats. They are thinking of sending out men, should my reply be favourable. Could you, or any readers of the *Journal*, supply me with the information—(1) The districts where they are mostly growing; (2) the average size of the trunk; also whether they are straight? I might say that some of the farmers in Essex, England, rely upon the willows to pay their rent. If farmers who have wet spots on their farms would plant a few of them, I am sure in a few years they would be well repaid.

The Orchards, Gardens, and Apiaries Division :—

The willows in the Dominion are mostly growing singly along watercourses, and are not suitable for bat-making. There may be one or two specimens in isolated positions, but this small quantity would not warrant the expenditure for the purpose named.

FORMULA FOR COW-DRENCH.

"JERSEY," Katea, Otago :—

Would you kindly publish in an early issue what you consider a good formula for a cow-drench?

The Live-stock and Meat Division :—

By a "cow-drench" we presume you mean the ordinary laxative, or purgative, usually sold for administration before and after calving, and in digestive disturbances. A useful formula is sulphate of magnesia 12 oz. to 16 oz., according to size of cow, with 1 oz. each of powdered gentian and ginger. Give in a quart of thin oatmeal-gruel or ale. An ounce of nitrate of potash may be added in after-calving cases. Where purgative effect is especially needed the addition of 1 dram of powered nux vomica with 2 lb. of black treacle will be of benefit, increasing the gruel to 2 quarts.

THE DOMINION'S EXPORTS TO BRITAIN.

Compiled from Manifests of Vessels sailed during Respective Months of Current and Preceding Seasons.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.	Sundry.
January,	1913	166,714	229,179	6,886	109,251	63,864	118,986	..	329	..	6,969	2,215	4,110	611 carcases pork.
,,	1912	237,284	302,399	12,424	114,512	64,005	95,994	..	..	7,295	6,365	1,942	3,407	59 ,,
February,	1913	326,337	403,698	12,666	89,098	81,733	127,968	..	..	..	12,520	4,295	7,973	64 carcases pork.
,,	1912	208,424	273,246	13,052	101,544	62,398	106,074	607	..	..	6,831	1,615	1,056	..
March,	1913	86,224	210,166	7,428	47,560	59,844	49,661	..	115	..	12,552	7,662	4,043	250 carcases pork.
,	1912	324,192	518,402	20,201	64,925	49,308	70,022	..	4,980	..	3,832	1,352	2,644	16 ,,
April,	1913	303,937	647,948	16,834	11,358	52,934	61,988	..	300	..	9,049	3,351	3,889	457 carcases pork.
,,	1912	213,178	355,829	7,046	38,986	38,137	31,615	4,905	2,180	..	5,134	1,958	4,458	..
May,	1913	418,221	731,520	22,073	637	46,304	33,281	..	265	2,000	15,751	5,005	9,057	100 carcases pork.
,,	1912	454,506	744,287	32,691	1,441	40,535	51,833	11,157	26,569	1,500	11,963	2,826	6,287	..
June,	1913	315,034	528,815	24,444	79	3,166	18,741	..	..	13,072	13,592	4,065	5,439	588 carcases pork.
,,	1912	170,738	287,697	24,605	558	7,712	18,138	9,160	7,622	2,039	5,646	1,168	1,213	221 ,,
July,	1913	215,713	331,353	14,030	..	1,687	17,169	5,651	300	9,190	9,682	1,720	10,793	..
,,	1912	291,097	371,474	29,457	684	1,255	16,567	44,324	23,216	20,573	7,463	1,856	5,892	*210 carcases pork.*
August,	1913	161,593	178,263	13,129	8	407	8,494	11,604	45	38,480	3,714	2,310	6,406	6 carcases pork.
,,	1912	207,239	157,589	10,478	559	..	10,409	42,580	38,802	19,562	3,758	523	4,219	..
September,	1913	133,122	83,521	5,334	6,575	2,020	7,176	..	..	16,336	3,826	1,501	10,049	16 carcases pork.
,,	1912	44,657	40,759	1,174	8,723	1,204	6,671	15,742	17,363	19,933	2,957	501	3,671	..
October,	1912	51,263	15,393	3,882	49,962	16,389	4,647	7,952	64,480	5,396	4,193	401	9,075	..
,,	1911	9,417	2,043	100	49,626	11,501	2,182	..	..	32,094	4,514	754	2,982	..
November,	1912	54,175	8,286	282	140,751	57,181	33,305	3,680	40,896	13,892	9,866	1,911	5,466	..
,,	1911	47,770	10,427	403	135,741	57,319	44,934	15,833	..	16,606	7,844	2,183	3,085	..
December,	1912	117,740	106,310	4,774	119,885	66,213	44,789	5,868	30,490	10,070	3,816	2,613	3,686	..
,,	1911	72,192	91,965	765	109,397	46,883	54,297	..	..	4,366	5,719	1,364	2,708	..

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE THREE MONTHS ENDED 30TH SEPTEMBER, 1913.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. Hinds.	Beef. Fores.
1913.							d.	d.	d.	d.	d.	d.
July 5	..	..	..	..	..	..	4½	4¼	6	5⅝	4⅛	3⅛
„ 12	1/3¾	1/4	1/4¾	1/8¼	1/11	2/4¾	4⅜	4¼	5¾	5⅜	4⅛	3⅛
„ 19	..	..	..	..	..	..	4⅜	$4\frac{3}{16}$	$5\frac{11}{16}$	5¼	..	..
„ 26	..	..	..	..	..	..	$4\frac{5}{16}$	$4\frac{3}{16}$	5¾	$5\frac{5}{16}$	4⅛	3⅛
Aug. 2	..	..	..	..	..	..	4¼	4⅛	5⅜	5¾	4	$3\frac{1}{16}$
„ 9	..	..	..	..	..	..	4¼	4⅛	$5\frac{9}{16}$	5⅛	4	3
„ 16	..	..	..	..	..	..	$4\frac{3}{16}$	4⅛	5½	5⅛	..	..
„ 23	1/3½	1/3¾	1/4½	1/7¾	1/10½	2/4½	..	..	5⅛	5⅛	..	..
„ 30	..	..	..	..	..	2/3¾	$4\frac{3}{16}$	$4\frac{3}{16}$	$5\frac{9}{16}$	5⅛	4⅛	3
Sept. 6	..	..	..	..	..	..	4⅜	4¼	5⅝	5¼	..	..
„ 13	..	..	..	..	..	..	4⅜	4⅜	$5\frac{11}{16}$	5⅜	$4\frac{3}{16}$	3
„ 20	1/3½	1/3¾	1/4½	1/7¾	1/10¼	2/3¾	4⅜	4½	..	..	4¼	3⅛
„ 27	..	..	..	..	..	..	..	..	..	5¼	4½	3

London Date.	Butter. New Zealand.	Butter. Danish.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila.	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila.	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
July 5	..	..	65/6	63/6	65/0	29/10/0	26/0/0	29/0/0	29/10/0	26/0/0	29/0/0	37/0	39/0	22/6	20/0
„ 12	..	..	67/0	65/6	65/6	29/0/0	25/0/0	..	..	..	29/0/0	..	..	..	..
„ 19	..	..	66/6	65/6	64/6	29/0/0	24/15/0	29/10/0	29/10/0	25/0/0	29/10/0	..	39/6	..	-1/6
„ 26	..	..	..	..	..	..	25/0/0	..	..	25/10/0	30/10/0	..	..	..	..
Aug. 2	..	..	66/0	66/0	66/0	30/10/0	26/10/0	31/0/0	30/10/0	26/0/0	31/10/0	..	..	..	..
„ 9	..	..	67/0	66/0	..	31/10/0	27/10/0	31/10/0	32/0/0	28/0/0	31/10/0	..	..	..	..
„ 16	..	..	67/0	66/0	66/0	32/0/0	28/0/0	31/10/0	32/0/0	28/0/0	32/0/0	..	..	..	..
„ 23	..	..	..	..	..	31/0/0	27/0/0	31/0/0	31/5/0	27/5/0	30/10/0	..	..	..	..
„ 30	..	..	..	..	..	30/0/0	26/10/0	31/10/0	30/15/0	26/15/0	30/10/0	..	..	..	..
Sept. 6	126/0	..	68/0	..	67/0	30/10/0	26/0/0	31/0/0	31/0/0	26/10/0	30/10/0	37/0	38/6	..	..
„ 13	..	130/6	68/0	..	66/6	30/0/0	25/10/0	31/0/0	30/0/0	25/5/0	30/5/0	..	..	..	..
„ 20	..	..	..	..	..	29/10/0	25/5/0	30/0/0	29/10/0	25/5/0	29/10/0	..	..	..	..
„ 27	..	..	..	..	..	30/0/0	26/0/0	30/10/0	30/0/0	26/0/0	30/0/0	..	36/0	..	..

HEMP AND TOW GRADING RETURNS.

SEPTEMBER.

Hemp.—The total number of bales graded was 11,011, as compared with 6,863 for the corresponding month of last year, an increase of 4,148 bales. For the twelve months ending 30th September, 1913, the number of bales graded was 158,397. as compared with 91,519 for the previous twelve months, the increase being 66,878 bales.

Tow.—During the month 3,476 bales were dealt with, as compared with 1,911 for the corresponding month of last year, an increase of 1,565 bales. For the twelve months ending 30th September, 1913, the number of bales graded was 55,236. as compared with 25,750 for the previous twelve months, the increase being 29,486 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF SEPTEMBER, 1913.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.	Common.	Rejected.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	210	951	227	21	..	1,409
Napier ..	..	..	107	204	..	..	..	311
Foxton ..	..	..	937	3,131	75	20	..	4,163
Wellington ..	..	..	1,403	2,096	195	49	..	3,743
Blenheim ..	..	18	184	..	..	..	..	202
Picton ..	..	21	162	..	..	..	..	183
Lyttelton ..	..	50	..	..	..	..	..	50
Timaru ..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	103	67	14	..	..	184
Bluff	..	..	121	577	65	3	..	766
Totals ..	..	89	3,227	7,026	576	93	..	11,011
Percentages of totals	..	0·81	29·30	63·81	5·23	0·85	..	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	300	333	64	697
Napier	..	48	..	20	68
Foxton ..	150	832	59	..	1,041
Wellington ..	104	456	416	14	990
Blenheim ..	66	72	..	..	138
Picton	..	66	19	..	85
Lyttelton ..	25	..	..	..	25
Dunedin ..	..	39	36	15	90
Bluff	..	114	135	93	342
Totals ..	345	1,927	998	206	3,476

Stripper-slips.—Passed for export: Foxton, 67; Wellington, 100; Lyttelton, 38—total, 205. Condemned: Foxton, 6; Wellington, 10—total, 16.

NEW ZEALAND-SAN FRANCISCO TRADE.

The following are the shipments of produce for San Francisco, Rarotonga, and Tahiti, and transhipments for Vancouver from New Zealand, since May last:—

—	"Moana," 23rd May.	"Aorangi," 20th June.	"Tahiti," 18th July.	"Moana," 15th August.	"Willochra," 13th Sept.
Gum, packages	30	45	6	34	..
Seeds, sacks	..	800	450	23	120
Grain, &c., sacks	84	59	75	72	28
Meat, cases	355	154	152	205	60
Onions, cases	19	13	5	10	2
Potatoes, sacks	27	24	9	15	3
Sundries, packages	210	122	370	157	422
Butter, boxes	8	4	792	7	545
Hemp, bales	394	262	371	391	377
Frozen lamb, carcases	2	2	2	2	2
,, mutton, ,,	..	..	30	54	..
,, veal, ,,	..	..	..	..	..
,, beef, quarters	..	..	32	..	..
,, sundries, packages	..	..	5	5	7
Timber, pieces	..	1,151	..	..	..

NEW ZEALAND-VANCOUVER TRADE.

Following are the shipments of produce for Vancouver and North American ports from New Zealand since April last:—

—	"Makura," 12th April.	"Niagara," 10th May.	"Marama," 6th June.	"Makura," 5th July.	"Niagara," 2nd August.	"Marama," 30th August.
Butter, boxes	6,535	465	1,210	4,401	720	1,753
Mutton, carcases	..	1,291	50	65	1,014	1,500
Beef, quarters	2,428	5,492	2,271	3,520	7,195	4,217
Veal, carcases	402	324	..	..	..	74
Frozen sundries, packages	86	79	90	471	42	..
Wool, bales	..	50	351	835	..	103
Grass-seeds, beans, &c., sacks	147	..	..	75	..	38
Hides and skins, sacks, &c.	249	270	1,675	748	200	1,468
Onions, cases	732	25	..	..	..	..
Sheep-skins, bales	24	..	..	522	..	..
Jam, cases	25	91	75	20	1	53
Sundries, packages	470	112	103	189	..	1,406
Potatoes, crates	..	..	..	..	..	..
Kauri-gum, packages	7	150	44	..	..	..
Hemp, bales	..	126	167	97	930	116
Rabbits, crates	..	..	500	15	100	500

STOCK EXPORTED.

The following table shows the numbers and descriptions of stock exported from the Dominion during the month of September:—

Port of Shipment.	Horses.		Cattle.		Sheep.				Pigs.		Dogs.			
	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To Vancouver.	To South America.	To Australia.	To Pacific Islands.	To Australia.	To South America.	To Pacific Islands.	To India.
Auckland ..	1	5	1	16	..	129	5	..	..	33	2	..	4	..
Gisborne ..	..	..	..	..	..	..	..	..	..	..	2	..	..	..
Wellington	12	..	..	..	..	..	..	200	..	..	3	1	..	1
Lyttelton ..	3	..	..	..	321	..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	..	..	62	..	..	..	2	..	3	..	..	..
Totals ..	16	5	1	16	383	129	5	200	2	33	10	1	4	1

Dunedin exported 1 donkey to Australia.

Export of poultry from Auckland: To Australia, 12 crates; to Pacific Islands, 1 crate.

The following are particulars of horses shipped: Thoroughbreds—2 stallions, 2 mares, 6 fillies, 5 geldings; harness—2 mares, 1 gelding; ponies—1 mare, 2 geldings; trotting—1 stallion.

The following are particulars of sheep exported: Lincoln—150 rams; Romney—151 rams, 3 ewes; English Leicester—321 rams; Border Leicester—5 rams, 4 ewes; Corriedales—53 rams; miscellaneous, 129.

PRODUCE IMPORTED.

The following return, compiled by the Customs Department, shows the total importations into New Zealand during the month of September, 1913, of agricultural and farm products:—

Item.	Quantity.	Value in
		£
Bran	..	..
Butter	..	..
Cheese	5 cwt.	25
Chaff	383 tons	1,549
Fruits, fresh, all kinds	3,092,169 lb.	27,375
Barley	..	..
Oats	212 centals	77
Wheat	..	..
Onions	11,594 cwt.	5,460
Pollard and sharps	30 tons	138
Potatoes	23 tons	268
Seeds, grass and clover	1,346 cwt.	4,875
Total value imported	..	£39,767

STOCK IN QUARANTINE.

THE following stock were received into quarantine during the month of September:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			MOTUIHI ISLAND (AUCKLAND).		
1	Holstein bull ..	Male..	Sydney ..	T. W. Discombe ..	Cambridge.
3	Shorthorn heifers..	Female	London ..	Hutchinson, B.N.Z.	Whangarei.
1	Shorthorn bull ..	Male..	,, ..	,, ,,	,,
7	Shetland ponies ..	Mixed	Vancouver	Ralph and Young	Auckland.
4	Romney rams ..	Male..	London ..	K. S. Williams ..	,,
			SOMES ISLAND (WELLINGTON).		
2	Holstein heifers (omitted from last month's return)	Female	San Francisco	Troup and Moore..	Wellington.
1	Irish setter ..	Male..	Liverpool	S. T. Sinclair ..	Napier.
2	Trotting mares ..	Female	San Francisco	James Conway ..	Wellington.
1	Trotting stallion ..	Male..	Ditto ..	,, ..	,,
1	Southdown ram ..	,, ..	London ..	H. B. Stuckey ..	Dannevirke.
4	Southdown ewes ..	Female	,, ..	W. H. Booth ..	Carterton.
			QUAIL ISLAND (LYTTELTON).		
1	Collie	Female	Liverpool	James Lilico ..	Lochiel.
2	Collie (pups) ..	,,	Dropped on voyage	,, ..	,,
3	,, ,, ..	Male..	Ditto ..	,, ..	,,
1	Pomeranian dog ..	,, ..	London ..	J. J. Addison ..	Christchurch.

Effect of the Recent Storm on Fruit Crops, &c.—The recent storm has done practically no damage to the orchards of the Dominion, but recent frosts in Canterbury damaged stone-fruit considerably. It is reported that in the Greytown and Carterton districts apricots, peaches, nectarines, plums, and gooseberries were almost destroyed. Pears were also badly affected. Not only were the fruits damaged, but potatoes, tomatoes, and peas were cut.—*T. W. Kirk.*

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Burning the Forest.] [*C. E. Wildbore, photo.*

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THE SURFACE-SOWN GRASS LANDS OF NEW ZEALAND.

A. H. COCKAYNE.

NEARLY 38,000,000 acres, or, roughly, 95 per cent. of the total land under occupation in New Zealand, is wholly utilized for pasture purposes. Another million acres are devoted to the growing of special annual crops used to supplement the feeding-capacity of the pastures during those crucial periods of the year when the grass-supply is liable to be insufficient for the proper sustenance of stock. Thus over 97 per cent. of the occupied land is devoted entirely to the maintenance of our flocks and herds. These figures serve to show the overwhelming importance of the grazing and pastoral interests in New Zealand agriculture.

To a country like the Dominion, where agriculture is dominant, and where the population per square mile is small and the price of

land is high, the extent and value of the agricultural exports must be the decisive factor in the determination of progress. When one turns to the agricultural exports the part played by the pastures is indeed striking. Nearly 95 per cent. of our exports are derived from the grass lands and the grass supplementary crops, while the land devoted to all other branches of soil-utilization is responsible for only 5 per cent. of the value of our exports. Thus the importance of the pastures in their relation to the agricultural exports is as striking as is that of the area they occupy.

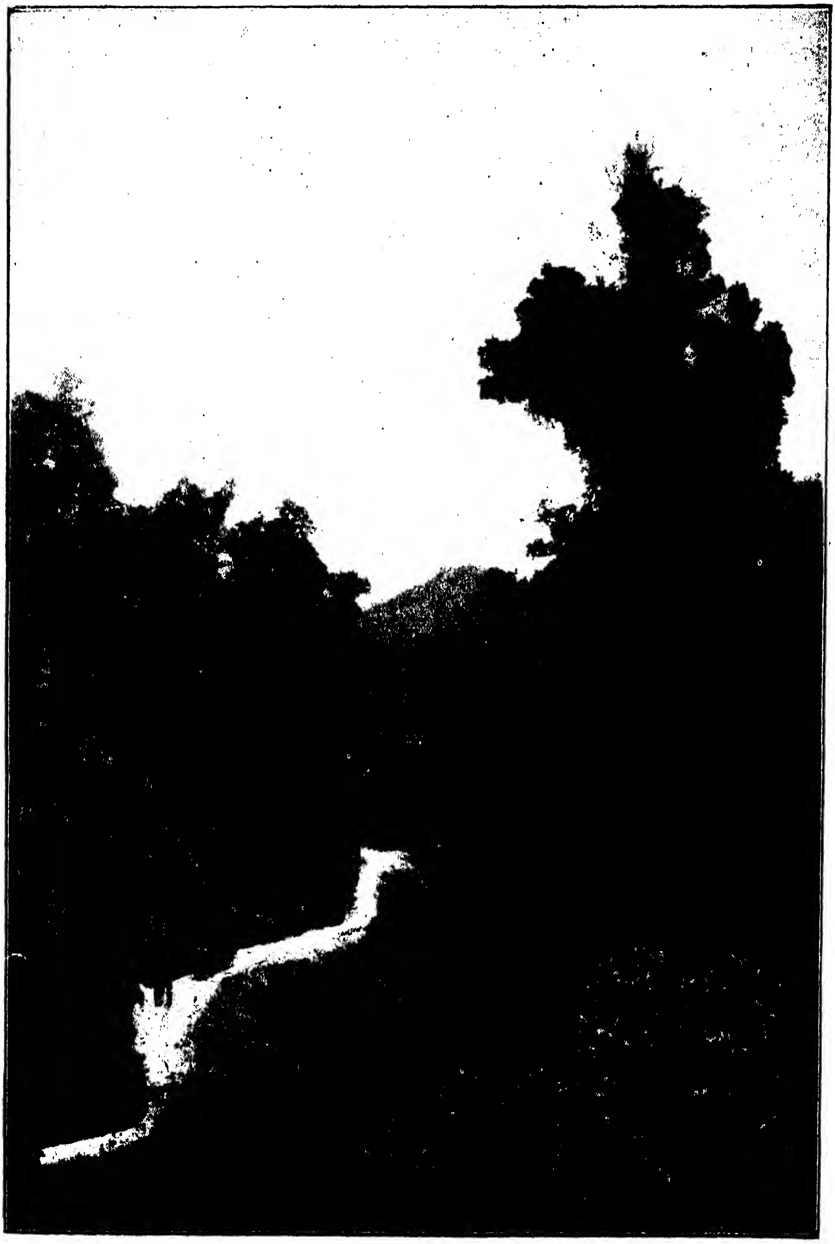
The main feature of New Zealand pastures is that with comparatively few exceptions they are capable of being grazed during the whole of the year. In most cases their productivity reaches its lowest point during the winter, and the value of the land is very largely based on the amount of stock that can be carried during that period. The provision for special winter feeding of stock is not undertaken to any great extent, as only about 3 per cent. of the land is employed for this purpose, and less than ½ per cent. of the pastures is devoted to the production of hay. This is in marked contrast to countries where the winter is at all severe. In Great Britain, for instance, over 30 per cent. of the pastures are cut for hay, and quite 40 per cent. of the cultivated land is utilized during the summer for the production of winter feed.

Another very important feature of the pastures of New Zealand is the very large amount—over 15,000,000 acres—that has been converted from native vegetation into pastures consisting of introduced grasses and clovers. The natural grass lands of New Zealand are on the whole of comparatively low stock-carrying capacity, while many of the artificial pastures are amongst the finest and most productive in the world.

The character and composition of our pastures vary very much. According to their origin they may be divided into three great groups. There are the natural grass lands, the ploughed-sown grass land, and the surface-sown grass land.

The Natural Pastures.

Nearly 59 per cent. of the pastures of New Zealand consists of natural grass land, consisting mainly of a tussock vegetation, amongst which many introduced plants have obtained a footing. These grass lands are virtually in an unimproved condition, and although, so far as area is concerned (comprising over 23,000,000 acres), they are the most important, they cannot be compared in value with the 15,000,000-odd acres of artificial pastures that have been laid down since the colonization of New Zealand.



TYPICAL NEW ZEALAND MIXED FOREST.

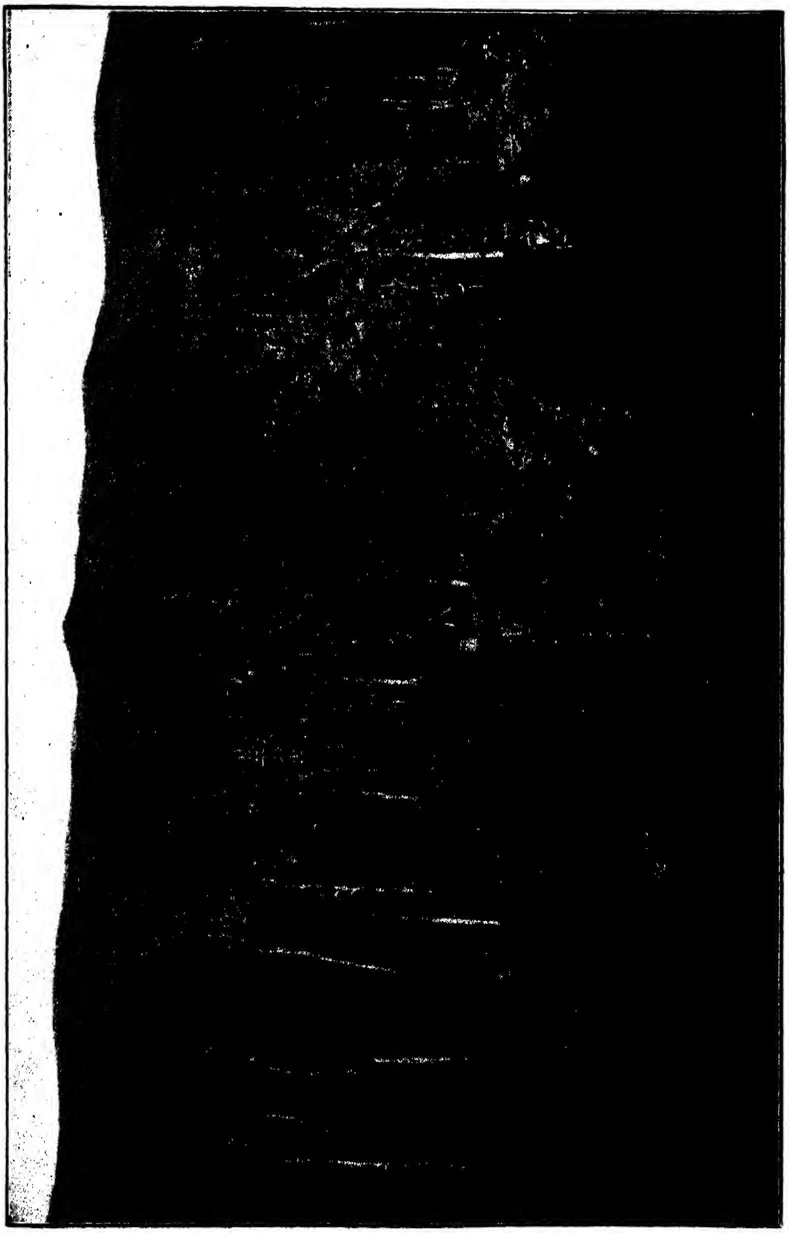
The Ploughed and Sown Pastures.

The ploughed-land pastures of New Zealand comprise some 5,000,000 acres. Their area is not extending in any marked degree, and they consist largely of semi-temporary pastures occupying land that may be used for general cropping purposes. The majority of the great rye-grass pastures of New Zealand belong to this category.

The Surface-sown Pastures.

Nearly 10,000,000 acres of the occupied land consist of permanent pasture that has been surface-sown after the removal of the native vegetation has been effected by means of felling and burning. Thus nearly 25 per cent. of the farm lands of the Dominion has been converted from forest into grass lands without the intervention of the plough. During the past ten years over 3,000,000 acres has been brought under utilization in this manner. In fact, during the past decade nearly 90 per cent. of the permanent-pasture land that has been laid down consists of surface-sown forest land. In no other branch of agriculture has such a marked progress been made, so far as area is concerned. Less than twenty years ago the ploughed pastures covered a larger area than did the surface-sown ones, whereas to-day the converted-forest grass lands comprise double those where the plough and cultivator have been employed. The quality of the land that has undergone this conversion varies very much. Some consists of the most highly priced agricultural land in New Zealand, while some is not worth as much as has been the cost of the process. The expenses in connection with this great phase of agricultural development are very considerable, and the 300,000-odd acres that are annually being brought under occupation represent the expenditure of quite one million sterling.

The great success that has followed the conversion of the better-class forest lands into grass has led to the assumption that all forest land can be profitably grassed. In this respect it must be remembered that the conversion process represents from £3 to £4 per acre, so that the conversion of forest land must result in the production of at the very least one-sheep country to be deemed in any way a payable proposition. In many cases the smaller farmer does not take into consideration the value of his own labour, and if this were done a good deal of poor bush country that has been laid down to grass would be shown to have cost considerably more than the present pasture is worth. Still, the grassing of nearly all the better types of forest land has been tremendously successful, and from the surface-sown pastures of New Zealand is derived a very considerable proportion of the annual wealth.



[C. E. Wildbore, photo.

MIXED FOREST FELLED PREPARATORY TO BURNING.

Natural Regeneration after Burning.

In very few instances is the destruction of forest by burning followed by the regeneration of a similar type of vegetation. This is not by any means to be wondered at when it is considered that the majority of the New Zealand forests represents the culmination of a long succession of plant associations finally resulting in forest. When this final association is destroyed nature has again to recapitulate to a certain extent the original process of development. In consequence of this the type that first develops is in nearly every case of a totally different character to that destroyed, and which may have taken hundreds and in many cases thousands of years to become established. Where burning takes place and is not followed by sowing, the type of vegetation that arises varies very much according to the climatic and soil conditions. In most cases the destruction of forest on better-class land is followed by a quite temporary association of annual plants collectively known under the name of "fireweeds." At the present time much of the vegetation may consist of exotic species, mainly belonging to the composite or daisy family, of which the Canadian fleabane and various groundsels and thistles are good examples. After this temporary association the quality of the soil and the climatic conditions to a very large extent determine whether the secondary associations will consist of bracken fern, manuka, tauhinu, or wineberry, which are the main plants that are likely to dominate unsown burnt forest for many years. In certain instances introduced plants may become dominant, and amongst these blackberry is the most familiar. A very peculiar feature of these secondary associations is their great vitality and ability to regenerate rapidly after being burnt, a feature that marks them off very strongly from true forest. This feature also makes their suppression and replacement by grass a difficult and expensive proposition. In most cases were the land left untouched it is probable that forest would again assume possession of the ground, but this would under natural conditions take many years, and under certain conditions probably the land would never revert to mixed forest. In certain cases, notably in beech country on sunny faces, a tussock vegetation follows burning, but this is the exception rather than the rule. On land that is likely to become waterlogged a rush association often develops after burning, and may persist for many years.

Conditions after Burning.

After a successful burn the resulting conditions very closely approximate to those obtaining on ground that has been ploughed and cultivated in such a manner as to produce an ordinary seed-bed. That this statement is essentially correct can be gauged by the

Fern-covered Burn, due to Poor Stocking

fact that after a "good burn" an excellent crop of turnips, provided the season is favourable, can be grown without any manipulation other than scattering the seed on the surface. It is, indeed, difficult for any one unacquainted with bush conditions to understand how it could be possible to grow a successful turnip crop on land that has never been cultivated in any way. Yet in very many cases turnips and allied seeds are always included in the grass mixtures to secure a fattening-crop within a few weeks after the seed has been sown.

Thus the conditions at the time of sowing, provided the "burn" and the weather are favourable, are excellent for the germination of seeds, and immediate covering of the ground with a plant population is dependent entirely on the quantity and quality of the seed used. I do not wish to refer here to the various types of seed mixtures that are used, as it is proposed to deal with this important subject in a subsequent article.

Replacement occurring after Sowing.

After the grass mixture has been sown a thick covering of grasses and clovers should become immediately established provided the conditions are in any degree favourable. After the first season, however, a great deal of replacement occurs. The whole object of successful management of "bush burns" is to direct this replacement and arrangement of the vegetation into those channels which will result in a thick uniform turf, consisting of those grasses and clovers that are valuable for grazing and will hold complete possession of the land for an indefinite period. In many cases, however—and this is particularly true of areas where errors in management or unfavourable circumstances have arisen—replacement in a direction antagonistic to the interests of the farmer takes place.

It is not too much to say that a great deal of the trouble that has arisen through harmful replacement in bush pastures is due in the first place to faulty seeding. Too much stress cannot be laid on the fact that it is only at the one period following burning that the conditions are suitable for the germination of grass and clover seeds. The initial sowing is, therefore, the all-important feature, and on it depends to a very large extent the future success of the pasture. No matter how careful is the after-management of the pasture, the harmful effects of inferior seeding, by increasing the chances of replacement in objectionable directions, are almost certain to arise. Even in cases where the seeding has been a good one, natural replacement by such vegetation as fern or manuka is often likely to take place unless the most careful management be adopted. It may be thought that any danger of replacement by harmful

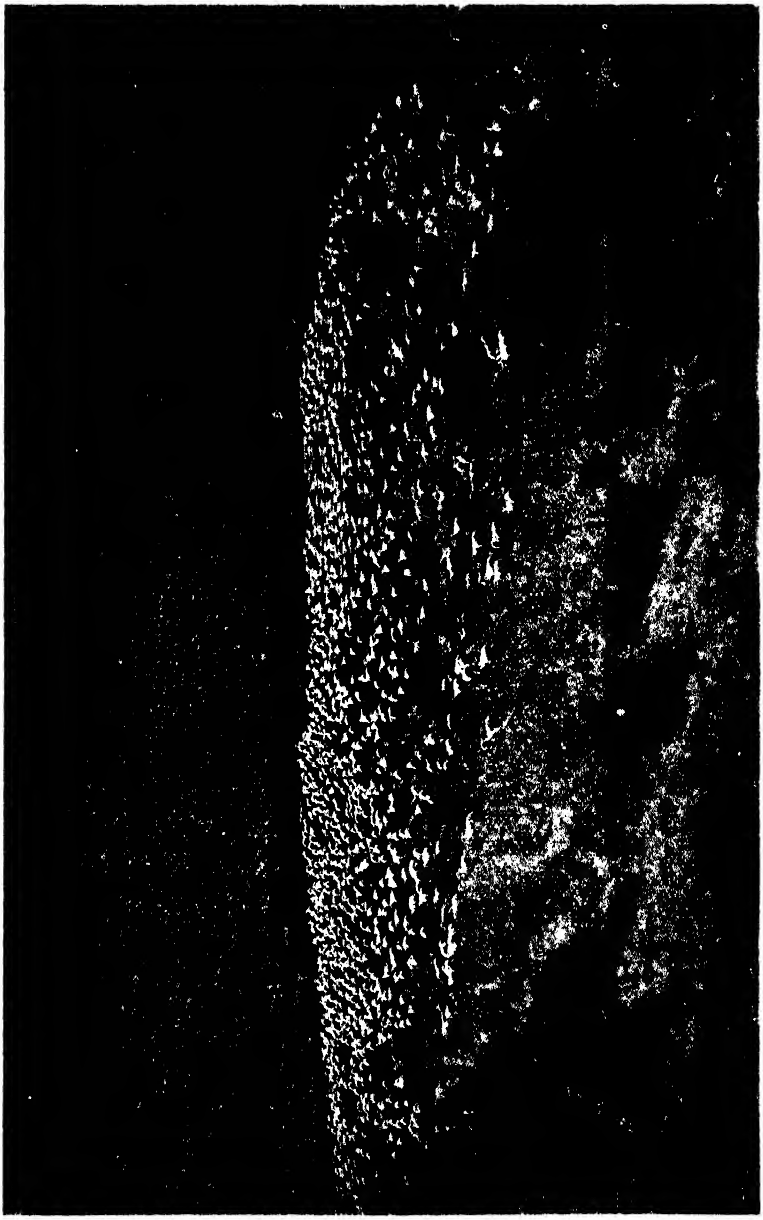
Wineberry taking Possession through Insufficient Stocking.

vegetation could be avoided by using a properly balanced mixture. It is, however, extremely difficult to decide what constitutes such a mixture, as, with the exception of rye-grass country, the composition of the mixture and that of the final pasture is in the vast majority of cases very different. In many cases the dominant grass of the pasture may not be by any means the dominant one that has been used in the mixture. The period during which the more temporary grasses that have been used are running out constitutes the time when replacement by harmful vegetation is most likely to occur. Of course, where the conditions after sowing have been unfavourable a more or less complete failure of the sown grasses may occur, and under such circumstances the country may rapidly and completely revert to native vegetation. In general, however, for some years after sowing the yield of herbage is often very great, but on poor soils this is often seriously diminished after a few years, especially where the majority of the seed used has been rye-grass, the duration of which under such conditions is of quite a temporary nature.

One of the greatest factors in controlling and supressing replacement in harmful directions is by judicious stocking. In fact, the proper employment of stock and the use of high-grade seed represent the two cardinal factors that determine the future utility of surface-sown pastures.

The weed problem is one that often becomes acute in many of our "bush-burn" pastures. This problem is one that is closely connected with that of replacement, and in many cases introduced weeds may constitute the most serious replacement that occurs. The weed problem, again, is one that is generally closely correlated with the quality of the seed that has been used. The use of weed-infested seed not only conveys the weeds right on to the ground that is to be converted into pasture, but also conveys it at exactly that period when the conditions for germination are most favourable. This fact should make apparent the danger of using any but the highest-grade seed on bush burns.

It has been quite a common custom to consider that any class of seed is good enough for bush burns. The fallacy of this is clear when one considers that the greater portion of such country is intended to remain in grass for all time. Again, in very many cases the configuration of such country precludes the possibility of cultivation ever being carried out, and the only chance to introduce with success those plants that are desired is at the time of the first sowing. Errors in seeding and management on cultivated land are comparatively easy to remedy, but when applied to surface-sown land that can never be profitably ploughed their effects must remain a permanent incubus upon the future utility of the pasture.



Natural Grass Country.—A Scene at Mustering-time.

CALVING.

PROCEDURE IN SOME OF THE COMMON TROUBLES.

W. G. TAYLOR, M.R.C.V.S.

IN these days of enhanced value of dairy stock and of appreciation of the really profitable producer accurately disclosed by herd-testing work—successful calving is becoming a matter of considerable importance. Should difficulty be anticipated at this critical period it is always advisable to obtain the services of a qualified veterinarian, for rendering the animal aid in parturition troubles often demands skilled treatment in addition to the needed experience in order to deal in a successful manner with any special circumstances which may arise. There are, however, many cases, especially in newly settled districts, where the services of a professional man are not available and the farmer is compelled to rely upon himself. Many farmers are, by reason of long experience, able to render the necessary aid, and there are many others who, given the correct procedure and observance of the necessary care, would also be able, where the complications are not of a very serious nature, successfully to assist the cow at this critical time. For the guidance of these some plain notes on the more common difficulties met with are here furnished.

Two points which must never be lost sight of by the farmer attempting to assist an animal in operations of this nature are the taking of strict sanitary precautions—having the hands thoroughly clean—and the ample provision of a good lubricant.

In the event of any difficulty being anticipated, the first procedure on the signs of calving, especially on presentation of any portion of the calf, is at once to place the cow in a bail and make a manual examination—that is, to discover by means of the hands the position of the calf. Before doing this preparation should have been made for any contingency that may arise. If possible, two or three capable men should be at hand, and three things must be provided—a lubricant, a disinfectant, and a rope. The lubricant, which must be freely used, should be non-irritant and should contain no salt. Preferably it should be rendered lard; failing this, vaseline or oil—linseed-oil will do very well. The disinfectant may be—kerol, 2 per cent.; or lysol, 2–3 per cent.; or carbolic, 5 per cent.; or sheep-dip, 5 per cent.

The hands, having been thoroughly washed in the disinfectant, should be well smeared with the lubricant, and the operator should proceed with the greatest care and precaution. Standing directly behind the cow he will pass the right hand into the passage to ascertain what portion of the calf is presented. Take the case of a calf with one of its fore legs back: here the other leg and the head would be presented. It would always be advisable under the circumstances to fix a rope on to the presented fore leg before proceeding further, then the hand would be passed in to try to locate the other fore leg. In the majority of cases it will be found that it is lying under the calf, extended backwards. If not too far back the hand should be placed palm upward against the knee, which should be gripped and slowly pulled forward, at the same time lifting the knee as high as possible. This will bring the fetlock and foot well forward. The hand should then be slipped down to the foot, and this should be taken in the palm of the hand and pulled into the passage, care being taken that the hoof is gripped in the palm of the hand so that no injury to the womb may occur. In a simple case this is all that is necessary. The cow will probably calve without any further aid.

In other cases where it is more difficult to raise the leg a rope must be passed in. To do this correctly a knot should be made at the end of the rope. The knot is then held between the second and third fingers, and is taken forward and passed round the back of the knee from the outside of the leg; it is left there while the hand is partially withdrawn; and then the hand is passed back to the inside of the leg to pick up the knot again, which is then withdrawn and tied around the other end of the line to make a slip-knot. This is then tightened up, and the assistant (who must at once obey any order given by the operator) is instructed to pull the cord when required. The hand is passed in again to the knee, when the assistant can be instructed to pull gently. Then it will be found that the foot can be reached. As soon as the operator has a firm hold of the foot the assistant is again told to pull, and at the same time the operator tries to draw the foot into the passage. If necessary, a second rope may be put around the fetlock, and a strain put upon this, which finally will have the effect of carrying the foot into the desired position. In the case where both feet are back the same measures may be adopted. Occasionally the foot will be found around the neck of the calf. In a case like this it is a very simple matter to bring the foot into the normal position and to proceed with delivery.

In some cases the head is not presented correctly. The common form met with is where the head has dropped down below the

opening. In a number of instances the procedure is very simple, consisting merely of finding the mouth or the nostril of the calf, elevating the head and bringing this into the passage. If it is found that this cannot be done with the hand, then a rope should be passed into the mouth over the upper jaw and the hand passed down under the lower jaw. Instructing the assistant to pull, elevate with the hand the lower jaw as the upper jaw comes into the passage. The reason why one must put the hand in the position indicated is that with the rope pulling on the upper jaw the mouth opens and the lower jaw catches on the bone, and may thus tear the womb. In some cases the head is so far back that the jaw cannot be reached. Under the circumstances endeavour should be made to get the fingers into the corner of the eye, and then pull the head sufficiently forward to enable the jaw to be reached. Failing this, a blunt hook should be inserted in the corner of the eye (of course, with a rope attached), and the head should be pulled forward till a grip of the jaw can be obtained. If it is found impossible to reach the eye an attempt should be made to grip the ear, and very often a very slight pull on the ear will enable the eye-socket to be reached.

Occasionally the head is found to be turned sideways from the shoulder. The same measures advised for the last-mentioned case may be adopted here. A very difficult case is where the head is turned directly backwards. Here the best thing to do is to try to pass a rope around the back of the neck and endeavour to pull the head forward. If the head can be reached at all, probably the first thing which can be gripped will be the corner of the eye. If so, the head should be pulled to the easier side. It is useless attempting to draw the head straight over. With a slight pull from the corner of the eye the operator may be able to reach the corner of the mouth. Once this is done the fingers or a blunt hook will make further progress a fairly simple matter. In cases like this it makes it very much easier if the lower jaw can be used, as a better lever is thereby secured.

When the operator has the calf in the required position for delivery the pull on the rope should always be downwards and backwards. This is essential. On account of the shape of the neck and shoulder a direct pull is liable to cause a jam in the passage.

Although the word "easy" has been employed in describing the above operations, it often requires a man of some considerable strength to carry them out successfully. This does not imply that rough methods should be employed, but rather that, combined with every care, some strength is demanded in certain cases. The cases outlined cover the more common troubles experienced in calving. Other difficulties will be dealt with in further issues of the *Journal.*

ROOT CROPS AT RUAKURA.

SWEDE, CARROT, AND MANGEL VARIETY TESTS.

Primrose McConnell.

Swedes.

All the swede crops at the Ruakura Farm of Instruction last season were grown in the same paddock. The previous crop was oats, and in May the land was ploughed with the digger to a depth of 7 in. It was again crossed with the disc plough in July, and then allowed to lie untouched until the beginning of October, when it was thoroughly cultivated, tine- and chain-harrowed, and the weeds (principally sorrel) gathered off. With the exception of a plot of Pioneer, which was sown on the 2nd November in order to make a comparison between the late and early sowings, all the varieties were sown on the 5th December with the double ridger, the rows being 27 in. apart, to admit of horse-hoeing. The fertilizers applied were 2½ cwt. of superphosphate and 2½ cwt. of basic slag per acre. The rows were several times horse-hoed during the season. Following are the results:—

Variety.	Yield in Tons per Acre.
Pioneer (early sowing)	42·85
Pioneer (late sowing)	33·10
Keepwell	32·37
Incomparable	28·60
Monarch	30·92
Cropwell	31·78
Perfection	33·53
Model	32·15
Green Tankard	31·21
Victory	33·28
Bronze-top	31·50
Up-to-Date	32·37
Magnum Bonum	34·99
Crimson King	33·15
Queen	30·05
Superlative	33·15

It will be noticed that on this occasion the gain by early sowing is a very substantial one, but this by no means proves that late sowing should be avoided. The weather is the prime factor in determining the results in such a case, and, unfortunately, this cannot be foreseen. When the season is suitable the late-sown swede is invariably the better quality and the better keeper. Such a matter can best be decided by the farmer himself, his experience of the average climatic conditions of his district being the main guide. When a late-sown swede is once established it will stand more drought than the early one; on the other hand, too late sowing may mean an entire failure to secure a plant.

MANGELS.

The mangels received similar cultivation to the swede crop, and were manured with 1¼ cwt. superphosphate, 1¼ cwt. basic superphosphate, 2 cwt. steamed bonedust, 2 cwt. Seychelles Island guano, per acre. Following are the results:—

Variety.	Yield in Tons per Acre.
Jersey Queen	50·00
Prizewinner	50·00
Golden Globe	44·11
Yellow Intermediate	47·15
Golden Tankard	42·76
New Sugar	55·44
Long Red	47·87
Gatepost	44·38
Red Intermediate	48·05
Yellow Globe	48·75
Golden Gatepost	45·00
Red Globe	47·21

Part of the mangel land was ploughed in May with the digger to a depth of 7 in., and part subsoiled to a depth of 12 in., a third portion being left untouched until the end of September, when it was ploughed with the digger to a depth of 7 in. The subsoiling gave an increase of 4 tons per acre over the ordinary ploughing; but there was no appreciable difference between the late and early ploughing. In the majority of cases, however, the earlier ploughing gave the better results.

Carrots.

The carrots were sown on the 2nd November and received the same treatment as did the swedes, a similar quantity of the same manures being applied. Following are the results:—

Variety.	Yield in Tons per Acre.
Sinclair's Champion	22·18
White Belgian	24·56
Yellow Intermediate	22·18

The advantage to be gained by sowing all root cops in rows sufficiently far apart to admit of after-cultivation cannot be too strongly emphasized. The surface cultivation minimizes the effects of drought and stimulates the growth of the plants, thus enabling them better to resist the attacks of blights and parasites.

AUCKLAND EXHIBITION.

THE DEPARTMENT'S DISPLAY.

In connection with the exhibit of the Department of Agriculture, Industries, and Commerce at the Auckland Exhibition, the Fields and Experimental Farms Division, which superintends the exhibition work of the Department, has laid out a miniature demonstration farm in the grounds adjoining the Department's court. Over half an acre of land has been set apart for the purpose, and this has been terraced to provide the necessary level areas. In all there will be 150 plots, each measuring 8 ft. by 5 ft. These will enable about three hundred different varieties of grasses, clovers, forage and root crops, as well as many plants of economic value, to be inspected by visiting farmers. The surrounding borders have been utilized for an instructive demonstration in native trees and shrubs, some sixty varieties having been planted. A display of over fifty specimens of coniferous trees and shrubs is also being made.

The work of sowing the seed in the demonstration plots was done by teachers of the Auckland District interested in agricultural education, under the direction of Mr. A. Macpherson, the officer responsible for the laying-out and conduct of the work.

Seven varieties of silver-beet and two varieties of perpetual spinach will be shown growing in the Department's demonstration plots at the Exhibition.

PLANT BREEDING AND SELECTION.

REPORT OF WORK AT RUAKURA.

A. W. Green.

At the Ruakura Farm of Instruction the work of plant-selection, which is pregnant with such vast possibilities in the raising of improved types of plants, from a productive as well as from a disease-resistance view-point, is receiving all the attention that can possibly be devoted to it.

It is difficult to realize the amount of detail and attention necessary in connection with this work. Time should be no object and the last consideration, but the tremendous amount of other work at this station, relating to the orchard, garden, and nursery, which must be daily attended to, curtails the time available for plant-selection. Further, at so popular an experimental farm as Ruakura, where often the whole of a working-day has to be devoted to interested visiting farmers and their instruction, general work must be laid aside. While under these conditions the results achieved in plant-selection in some other countries where individual men are able to devote their whole time to the subject cannot be hoped for. Yet it is possible to do useful work at Ruakura with the cordial assistance at all times available where progressive methods are in question.

The methods obtaining at Ruakura, and the results so far achieved under primitive conditions, will perhaps prove of some interest.

Testing of well-known Commercial Varieties.

Large numbers of commercial varieties were in the first instance obtained and grown in plot experiments. From these plot experiments, which in every case were subjected to uniform treatment, the basis for a first comparison of varieties was instituted.

With few exceptions, one year's trial has not thrown out any particular variety, second- and third-year plots being sown to give more conclusive data. Varieties suitable to the locality are thus determined and retained for propagation and selection, those unsuitable being discarded.

TESTING OF NEWLY INTRODUCED VARIETIES FROM OTHER COUNTRIES.

In the majority of cases, to do this takes a longer period, as usually the amount of seed procurable is small, and the first season's crop insignificant. It is therefore necessary to increase the variety until a sufficient bulk is obtained to allow of a test being made on an adequate scale. Further, observations clearly point to the fact that new varieties, with very few exceptions, show a marked improvement after the first season of importation.

In many instances, especially with cereals, the new crops introduced do not prove to possess any advantage over those which have been long under cultivation in this district. On the other hand, a few valuable varieties have been added to our farm crops.

One of the latest additions, and one which so far appears to merit special attention, is the *White Lodino clover.* In a comparative row test, with a high-grade strain of white clover, the points are all in favour of the new variety. Every farmer knows the value of white clover, and although it does not throw as much feed in a season as red clover it is lasting. It also succeeds in land where the other fails, and when introduced spreads rapidly, forming the dominant plant in a permanent pasture. The value, then, of an improved white clover cannot be overestimated, and the advantages which White Lodino clover appears to possess over the ordinary variety recommend it to a test on a large scale.

Emerald rye-corn is another valuable introduction, proving in most respects an improvement on ordinary rye-corn. In a comparison with the latter Emerald is more vigorous, giving an average height of 6 ft. 6 in., against 5 ft. 5 in. produced by the ordinary. The heads are longer and heavier, and the grain is superior in quality, being both lighter in colour and larger. Emerald threshed 46 bushels per acre, against 38 bushels per acre yielded by the ordinary. The two plots were of exactly the same area, grown on uniform soil in the same field. An equal weight of seed was sown in each plot. Two plots of larger size have again been laid off this season.

SYSTEM OF SELECTION.

Selection of individual types from the various commercial strains, and the testing of them, forms the main line or method followed in this work up to the present time. Artificial cross-pollination has not entered the field, except with the New Zealand flax, in which case crosses were made four and a half years ago. A single head or single plant forms the basis of each selection. When choosing heads, two objects are kept in view: (1) Choosing variations around a given type, which type is as near as possible to what should

represent the true variety under selection; (2) choosing the widest forms of variation, which in some cases may mean immediate change. Thus a mixed strain can be brought down to a pure strain. Opportunity is also afforded for the isolation of any new type which may already be existing in the variety. Under this method many strains have been picked out which, when reproduced, proved only to be samples of named varieties that had through some means become mixed.

With selections taken from lately introduced varieties there is always a chance that the selector may isolate a strain which, although new to him, is simply a mixture of a foreign variety known only in the country from which the sample was secured. This, however, is not of much importance, but it is a difficulty which cannot be overcome until the selection is propagated to some extent and distributed for identification.

Two main and more important objects in the selector's work, after isolating these various types, are to prove which will succeed best under local conditions, and to show that they reproduce themselves true to type. This does not apply to cereals alone, because at the present time the successful cultivation of almost every agricultural and horticultural crop in the North depends mainly on its resistance to diseases. During the last few years the spread of fungoid diseases and insect pests has been enormous, proof of which will be found in increased demand for fungicides and insecticides as the result of the adoption by growers of preventive measures, either by treatment of seed before sowing or by the spraying of crops later. Concurrent with this has arisen a keen demand for blight- and disease-resisting varieties.

In the face of these conditions the course of plant-selection at Ruakura cannot at present follow any other line than that which will lead towards the isolation of disease-resistant strains. As an illustration, in the year 1907 some twenty-seven varieties of oats were sown in a test area, to form what was intended to be a groundwork for initial selections. Immediate results showed that twenty-four out of the twenty-seven varieties rusted to such an extent as to be entirely worthless. The three varieties proving less susceptible to attack were Algerian, Argentina, and Red Rust-proof.

Eventually, after making several hundred single-head selections from these, carefully examining individual characters during the growing period, comparing results, and noting the immunity from disease of each, the oat now known as the *Ruakura Rust-resistant oat* was evolved. Resultant from one head in 1908, over 100 acres are now in crop at Ruakura alone. Interested farmers to the

number of 220 have each received a 1 lb. free sample, while some 20 bushels have been forwarded to other countries and to the Department's Fields Instructors. This year's reports, coming, as they will, from many and widespread localities, should give evidence of the worth of the oat, and enable it to be truly represented before being placed on the open market for extensive propagation. Up to the present date previous experience is again borne out this season. On areas sown in several of the fields under most unfavourable conditions it stands out prominently as a strain possessing a most vigorous constitution. This is no doubt due to a very great extent to its strong rooting habit, for without such it could not make the amount of growth it does. When sown in autumn it is found almost a necessity to have the crop fed off twice with sheep before allowing it to stand for grain; otherwise growth will be too heavy, and the crop will lodge.

It can therefore be plainly seen that in plant-selection a careful study of the root system is as important as, if not more so than, a study of those parts of the plant above ground.

Development of the Work of Selection.

On account of the wide field open for valuable research and as a result of the encouragement from the few gratifying results obtained with oats, the scope of the work now undertaken extends over a greater area.

Wheats, barleys, grasses, clovers, lucernes, mangels, swedes, potatoes, and various vegetables and fruits are all under observation.

Selection is directed almost entirely towards *disease-resistance.*

Cereal Plots.

Eighty-five varieties of cereals occupy a place in the present field test, from which it is hoped to secure something of value. Included in these is already selected a number of strains which can be relied upon as pure strains.

Additions in the way of new varieties are somewhat numerous. Five varieties of wheat and five of barley came from the Commonwealth, while one of barley and four of oats were obtained from Lincoln College. These are as follow: From the Commonwealth: Wheats — Huguenot, Thew, Haynes' Blue Stem, Bobs, Warren; barleys — Goldthorpe, Golden Grain, Standwell, Kinver, Skinless. From Lincoln College: Oats — Sandy, Island Magee, Joanette, Banner; barley—Archer.

Last season's test reduced the variety number of oats under trial from twenty-six to five, and wheats from twenty-three to thirteen. Barleys remained unchanged. In the same field, and sown under similar field conditions, are upwards of one thousand single-head and single-plant selections, besides plots in their second and third years from initial selections.

With oats, Algerian and Rust-resistant are the only varieties dealt with on a large scale.

With wheat, Rieti forms the main plot, and with barley, Invincible, Maltster, and Cape are the principal varieties.

Mangels.

Selection work with mangels cannot progress at the same rate as with cereals, as it takes two years from seed to seed. However, much can be done in selection during the time the roots are making seed-growth, for it is then that many are attacked by diseases. During this period last season the number of selections, which totalled 130, were reduced to twenty-one. One difficulty experienced is that a few of the most uniform and soundest roots would not run to seed the second year.

The weight of seed obtained from individual roots varied considerably, the greatest being 1 lb. 12 oz., and the least 13 drams.

Swedes.

Superlative is the only swede yet worked on. This is now entering into its third year of selection. The heaviest weight of first-grade seed from one root amounted to 8 oz. 14 drams.

Lucernes.

A series of plots, sown with nine varieties, formed the basis for the experiments with lucerne. There is, no doubt, a golden opportunity for great advancement to be made with this plant by selection.

Not one out of the nine varieties under test can claim immunity against leaf-spot fungus. Knowing, then, that lucerne cannot fail to become a favourite crop with dairy-farmers in the near future, every endeavour should be made to isolate from an existing strain or breed a more disease-resistant variety.

The number of selections made last season totalled twenty-six. These were all that could be found showing any variation in type. The best selection yet made for resistance to leaf-spot was chosen from the Peruvian variety.

Conclusion.

In concluding this report, mention may be made of a few difficulties which beset the plant-breeder—difficulties which cannot readily be overcome.

(*a.*) The small-bird nuisance is perhaps the most troublesome, and if not controlled will ruin all small-plot experiments. From the time of sowing until seedlings are well above the ground the plots must be watched unceasingly, and again during the period of ripening. Shooting seems to be the only satisfactory way to keep birds off.

(*b.*) The appearance amongst pedigree cultures of wild forms, which must be rogued out either in the field before cutting or in the seed-shed after threshing. The former is by far the simpler and the safer method.

(*c.*) Weather-conditions near or at harvest-time. These influence greatly the weight, quality, colour, and appearance of samples, all of which must be taken into account when a comparison of varieties is to be made. Not unfrequently a good crop is spoiled by unfavourable weather.

(*d.*) Threshing, labelling, and storing of selections from harvest-time until next sowing is a work in itself, and, unless sufficient space under cover of sheds be available, this presents a difficult problem.

Finally, extreme care must be exercised in order to keep strains pure. One rogue will soon multiply into hundreds. Precautions should therefore be taken always to feed horses on crushed grain and straw chaff while working on land in the preparation of the seed-bed.

The field of veterinary science is no longer a limited one of mending the broken parts of animals that come within our domain, but the richer, broader work of controlling animal-diseases throughout the earth ; the saving of nations from the great economic losses by animal-plagues, the records of which precede the story of the earth as told by the Bible ; the field of animal-food inspection that must determine the physical strength, the freedom from diseases, the happiness and prosperity in a great measure of the people of every land on the face of the globe. The study of animal-food problems and their best methods of uses means, indeed, the determination of commercial wealth and prosperity of those engaged in agriculture and animal industry.—*Professor W. Horace Hoskins, of the University of Pennsylvania.*

WOODLANDS' PRIDE.

A purebred Holstein, which in her twentieth year gave, under official test, during the past season 12,555·85 lb. of milk and 475·85 lb. of butter-fat. She is the property of Mr. Maitland Leith, Woodlands, Southland.

LUCERNE.

VARIETIES FROM IMPORTED SEED AT MOUMAHAKI.

W. S. Hill, B.Agric.

The obtaining of a suitable supply of green fodder for stock in the drier months of the year is one of the most serious problems facing the New Zealand farmer. Lucerne is a plant especially adapted for this purpose. Not only does it abundantly provide that requirement, but it thrives under the hottest of climatic conditions, by means of its deeply penetrating roots appearing to obtain moisture from depths unsought by other plants.

That lucerne can be cultivated more or less profitably in most arable portions of New Zealand has been demonstrated during the last few seasons. It now remains to ascertain which strains or varieties are best adapted for general culture and for special conditions. With this view testing is being carried out at the Moumahaki Experimental Farm on the following lines:—

(1.) Varieties grown from imported seed are being tested.

(2.) Single-plant selections are being made with the intention of raising new and improved strains from acclimatized plants.

The results of the trials, for the season 1912–13, of the varieties grown from imported seed at Moumahaki are shown below.

It is desired to emphasize at the outset that these trials, with one exception, are from imported seed. It is evident that lucerne-plants are capable of adapting themselves to local conditions and of changing their characteristics, as seen in the case of the evolution of the Colonial (Marlborough-grown) and Hunter River (New South Wales) varieties from the Provence (commercially European) variety. It is expected that when the seed harvested from these varieties under trial at Moumahaki is resown the results will be of great interest. Numerous single-plant selections have been made, and should the progeny of some of these retain the qualities of their parents it is certain that still more prolific strains than "Marlborough" will result.

The variety plots at Moumahaki consist of two series. The larger plots occupy field 17 (9 acres), situated on the highest and most exposed portion of the farm. During the past season the produce of this has been utilized for ensilage, hay (two crops),

and grazing experiments. Although not yielding as heavily as the smaller plots, still each variety showed a characteristic yield. The smaller plots are situated on a slightly stronger sandy loam and in a more sheltered position. Four rows, 2 ft. apart, of each variety were sown in the late spring of 1911. All germinated well, and during the summer and autumn of 1912 they were mown. Fresh growth commenced from the beginning of August onward, depending on the variety.

No. 1 row of each variety was first mown on the 30th September, and again on the 19th November. This row was then allowed to seed. It was harvested on the 27th March. Subsequent mowings were made when necessary.

No. 2 row of each variety was first cut on the 10th October, and again on the 19th November. From then onward this row was treated in a similar manner to No. 1 row.

No. 3 row was first cut on the 20th October, and again on the 19th November. Two other cuttings were made when in flower, and subsequent cuts when necessary.

No. 4 row was cut for the first time on the 19th November, when all these rows were in more or less full flower and thoroughly mature. Further cuts were made when required.

Table I represents a comparison between the one mature cut in row No. 4 and the two immature cuts in the other rows, and the average increases due to the one cut. Table II represents a more detailed comparison for the same period.

The advantages of making one thoroughly mature cut in the spring are not only confined to the immediate results, but it is apparent in each of the eight varieties that cutting the herbage when in a young succulent condition in early spring has a very definite detrimental effect on the growth of the plants during the remainder of the season. At the time of writing (31st July) the stunted growth of row No. 3 in Colonial and Hunter River in comparison with that of row No. 4 is most striking. In the Peruvian and Arabian varieties this difference is not so perceptibly marked.

At the end of the season 1912–13 the losses of green fodder in tons per acre due to the double immature cutting were as below :—

	Tons.		Tons.
Colonial	5·64	American ..	11·36
French	5·61	Turkestan ..	4·14
Hunter River ..	11·16	Peruvian ..	3·45
Hungarian ..	9·26	Arabian	2·55

From the above it will also be concluded that the Peruvian and Arabian varieties suffer least by cutting in the early stages,

and on this account give promise as varieties suitable for grazing purposes.

No. 1 and No. 2 rows, after producing a crop of seed, grew more rapidly and produced a greater weight of fodder than either No. 3 or No. 4 row. The Hunter River variety produced the largest quantity of seed, Colonial yielding 20 per cent. less; while the other varieties averaged 40 per cent. less than Hunter River.

The time for cutting lucerne, either for ensilage, hay, or green fodder, is usually judged by the appearance of flowers. This is, as a general rule, a correct indication. It has been pointed out by authorities on lucerne that this plant should never be cut before fresh shoots or buds appear from the crown. It is said that if the crop be cut before these shoots appear, the plant is considerably weakened and the succeeding crop is much diminished. During the latter portion of the season the lucerne does not flower, and consequently the time for cutting has to be judged by the appearance of these new growths. It would appear that the custom of basing the time of cutting lucerne on the appearance of flowers has crept in on account of the usual correlation at this period of the breaking into flower and the growth of new shoots. It is advocated that growers should study these points, and any observations on this subject would be welcome. Another authority considers that lucerne should never be cut until the new buds have formed at the base of the plant, but that this applies only to the first year, as when once the plants are established new buds are forming almost continuously.

When it is considered that by far the largest proportion of nutrient matter, especially protein, is contained in the leaves, and that the ravages of the leaf-spot fungus cause a large percentage of the older leaves to fall, then it is apparent that cutting should not be delayed too long, or quality will be sacrificed to quantity. Judgment as to time of cutting should strike the happy mean in order to obtain a maximum of quantity and quality. For these reasons the aim of the plant-breeder is the selection of plants producing a maximum yield, a high percentage of leaves, and showing resistance to the attacks of the leaf-spot fungus.

A brief description of the varieties at present growing at Moumahaki is appended.

Colonial.—This is grown from seed produced in the Marlborough District. The total yield of 33·24 tons per acre up to the 31st May shows the capability of this variety. Fresh growth again commenced during the first week in July, but this has been allowed to remain on account of the experience quoted in cutting lucerne

at a young stage, and this growth will be included in next season's yields. The variety is characterized by the dense succulent growth of herbage. The leaves are broad, and the density and spreading nature of this variety are of great assistance in checking the growth of annual weeds. The herbage of the plants in rows 2 ft. apart entirely filled the intermediate space, leaving this free from weeds when the crop was cut. On this season's trial this variety is the one recommended to be grown for conditions similar to those obtaining at Moumahaki. During a portion of the growing period (fifty-two days) the Colonial lucerne grew at the rate of 1 ton per acre in four days and three-quarters.

Hunter River.—Only very little inferior to Colonial lucerne for this season, yielding at the rate of 32·82 tons per acre. The variety is of taller growth, the stems are thicker and stronger, and the leaves more linear than the Colonial. Some excellent single-plant selections have been obtained from this variety. During one period (fifty-two days) the growth was at the rate of 1 ton per acre in four days and a third.

Peruvian and Arabian.—These two have very similar characteristics, and are practically indistinguishable. From a casual observer's point of view these two are the best varieties—this on account of their rapidity of growth. After cutting they are usually several inches high before the other varieties have started growth. The following table shows a comparison of the weights and heights on the 19th November:—

Variety.	Weight in Tons per Acre.	Height in Inches.
Colonial	14·16	27
Hunter River	12·06	34
Peruvian	5·34	33
Arabian	5·46	32

Both varieties mature early, and are the first to be attacked by leaf-spot, consequently requiring more frequent cutting. The growing period is longer than in the other varieties, there being a growth of 18 in. high during the months of June and July, and this yielded an average of 2·73 tons per acre. It might be thought that such rapidly growing varieties would be susceptible to frost, but a 10 in. growth was unaffected by six degrees of frost on the 14th June.

The other varieties—*i.e.*, *French*, *Hungarian*, *American*, and *Turkestan*—are all of a similar nature. They have a short growing period and an average yield during the summer months.

Conclusions.

1. That all eight varieties of lucerne suffer more or less from being cut back in the spring when the foliage is immature.

2. That Colonial (Marlborough-grown) and Hunter River varieties so far give the best results for this district.

3. That the Peruvian and Arabian varieties promise well as varieties that would withstand the effects of grazing.

The system carried out at this farm is commended to growers. The first cut of the season is made in the late spring and used for ensilage. This is preferably made into silage because—

(1.) The variable weather-conditions during the month of November are not, as a rule, suitable for haymaking.

(2.) There is usually at this time ample green fodder in the shape of grass to satisfy the requirements of stock.

(3.) The weeds in the form of Scotch thistles, sow-thistles, and annual grasses have their maximum growth at this period, and, while making good silage, would deteriorate the sample of hay.

The next growth is comparatively free from weeds, and, when mature, an excellent sample of hay is secured. The following growth is suitable for cutting and feeding to stock, or if not required for this purpose can be made into hay. Grazing with stock from now onwards does not seem to be so detrimental to the subsequent growths, but much more experience is required on this point. This will be thoroughly tested now that a sufficient area of lucerne is available.

It is apparent that care in the selection of seed and some judgment in respect to time of cutting will increase the yield of this valuable fodder plant.

Table I.—Comparison between One Mature Cut and Two Immature Cuts during Period 1st July to 19th November, 1912.

Variety.	Yields in Tons per Acre.				
	No. 1 Row (two cuts).	No. 2 Row (two cuts).	No. 3 Row (two cuts).	No. 4 Row (one cut).	Average Increase due to One Cut.
Colonial	11·01	12·24	13·14	14·16	2·03
French	6·90	6·66	5·43	6·84	0·51
Hunter River ..	10·56	10·32	9·06	12·06	2·08
Hungarian ..	4·74	5·19	4·68	7·98	3·11
American ..	5·34	4·32	4·48	7·68	2·97
Turkestan ..	5·76	4·08	4·80	4·92	0·04
Peruvian	5·28	5·35	4·89	5·34	0·17
Arabian	6·12	6·36	5·67	5·46*	Loss 0·59

* Due largely to experimental error.

TABLE II.—DETAILED COMPARISON BETWEEN ONE MATURE CUT AND TWO IMMATURE ROWS.

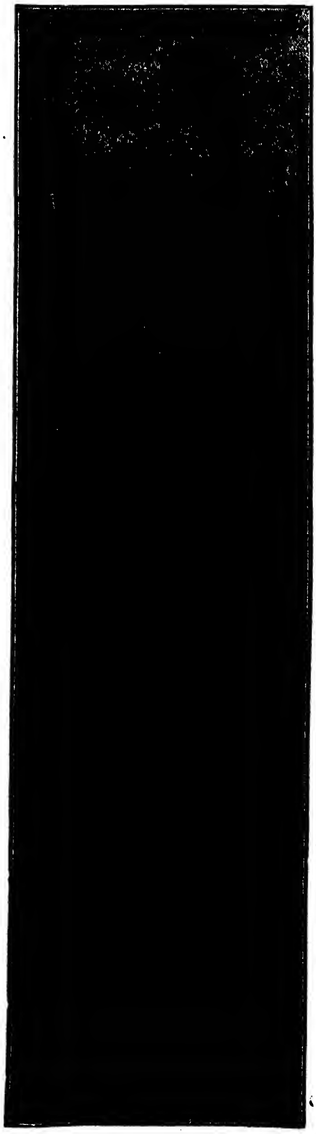
Variety.	Height in Inches.	Leaf-spot.*	Yield in Tons.	Remarks.
No. 3 Row (cut 20th October, 1912).				
Colonial	22	2	5·82	Not yet in flower.
French	14	3	3·81	Leaves damaged.
Hunter River	24	1	5·46	Healthy.
Hungarian	18	1	3·42	Healthy.
American	16	1	3·36	Healthy.
Turkestan	18	2	3·60	Irregular in growth.
Peruvian	24	4	2·97	Leaves falling.
Arabian	23	4	2·85	Leaves falling.
No. 3 Row (cut 19th November, 1912).				
Colonial	21	1	7·32	Stalks succulent.
French	14	1	1·62	Poor growth.
Hunter River	20	2	3·60	Succulent.
Hungarian	16	1	1·26	Poor.
American	8	1	1·12	Very poor growth.
Turkestan	15	1	1·20	Poor.
Peruvian	22	3	1·92	Succulent.
Arabian	21	3	2·82	Succulent.
No. 4 Row (cut 19th November, 1912).				
Colonial	27	3	14·16	One-tenth in flower.
French	25	4	6·84	One-twelfth in flower.
Hunter River	34	3	12·06	One-tenth in flower; strong, thick stem.
Hungarian	26	3	7·98	One-twentieth in flower.
American	27	4	7·68	One-twentieth in flower.
Turkestan	26	3	4·92	One-twentieth in flower.
Peruvian	33	5	5·34	One-tenth in flower.
Arabian	32	5	5·46	One-tenth in flower.

* Degree of severity, 0 to 5.

PLOUGHING IN GERMANY.
Motor-plough made by Paul Adler, Hamburg. £1,050 f.o.b., Hamburg.

OBTAINING UNMUTILATED PLANTS OF LUCERNE.

THE METHOD ADOPTED AT MOUMAHAKI EXPERIMENTAL FARM.



THE method adopted to obtain unbroken plants of lucerne for exhibition is to excavate a shaft some 2 ft. 6 in. wide by about 7 ft. long. This is dug out to the required depth. In this instance it is continued to 20 ft., as the roots and rootlets are found to have penetrated to that distance. The shaft is opened quite close to a suitable plot of lucerne. The side of the shaft is trimmed until the upper roots of the plant are exposed. The course of the deeper roots is then watered from the nozzle of a hose, and so the whole plant is secured without a break of its deeper and finer roots. The cost after the shaft is excavated is comparatively trifling.

A French statute of 1912 reorganizes the departmental and communal agricultural instruction in France. It establishes in each department or district a bureau of agricultural services. This bureau is to have charge of the dissemination of agricultural knowledge, agricultural instruction in public education institutions, economic and social aspects of agriculture, including agricultural insurance and rural hygiene, agricultural information, statistics, direction of experiment fields, technical researches and commissions, and in a general way of all agricultural interests with the exception of the veterinary and forestry services in the agricultural stations.

WERAROA AND MOUMAHAKI EXPERIMENTAL FARMS.

THIS SEASON'S SCHEME OF ACTIVITIES.

E. Clifton.

Weraroa.

An important work during the coming season at the Weraroa Experimental Farm of the Department will be the further preparation and cultivation of that portion of the estate recently cleared from the remains of the forest covering—an area of 90 acres. The main portion of this will be devoted to root-production. It is recognized that after high-class arable land has been cleared from the last residue of the bush, no matter what the seed mixture used may be, the pastures may contain an undue preponderance of inferior grasses, and at Weraroa the quality of the soil is too good to permit it continuing under anything but the most profitable of productive plants.

Another important development at Weraroa will be the preparation and sowing of some 25 acres in lucerne. Only the varieties which are considered the most suitable will be used, those being excluded which the experience of the Department has already demonstrated to be unsuitable for New Zealand conditions. In preparing the land for these lucerne demonstrations the soil has been ploughed at different depths, varying from the lighter ploughing of 6 in. or 7 in. up to 14 in. This last work was performed with a single-furrow disc plough, provided with two discs, one above the other, the upper disc being slightly in advance and removing the first layer of soil, and the second penetrating to a greater depth and but slightly elevating the subsoil, although a slight admixture of the soil and subsoil naturally results. Tests will also be carried out as to the various periods of cutting. A certain proportion will be set apart to demonstrate the best methods of depasturing stock on lucerne, having special regard for the safeguarding of the plant from destruction and the animal from the effects of bloat on the rich succulent feed. The primary object of these tests is to popularize the use of lucerne.

Demonstrations will also be continued at Weraroa this season in regard to the use of forage crops, which will include maize, millet, peas, and clovers. Of these, maize is the plant on which most reliance is placed at Weraroa. A perusal of the reports from this farm for several years past will testify to the inestimable value of green maize for maintaining milk-production at its highest during the drier months of the year, a period when dairy-farmers too often experience a diminishing flow. In addition to the feeding-out of green maize the Department has arranged for the erection of a silo. This will be constructed on the most economical principles so that it may be of the greatest practical value to the dairy-farmer desiring to adopt this method of fodder conservation.

The Holstein herd at Weraroa still maintains its high character of the past. It now consists of just over one hundred head of purebred stock. The milking Shorthorns of the Australian type give every promise of providing a most valuable addition to the dairy herds of the Dominion. The milking herd is being added to by the addition of selected Shorthorn cows of a definite dairy type, and it is believed that they are of such breeding that they will claim registration in the herd-book of the lately formed Milking Shorthorn Association. These cows will be used with the purebred Australian milking Shorthorn bulls.

Feeding-tests will be continued in order to arrive at the most economical method of raising calves. Experiments have already been carried out in this connection, but it is not the desire of the Department to report on the results of tests of this description conducted merely for one season. It is accepted that such tests only become of value when they have been carried out over a series of years.

Buildings have been erected at Weraroa for the reception of an equipment that will permit the manufacture into butter and cheese of the milk produced on the farm. Special cheeses are being manufactured by the Department's Instructress in Soft and Fancy Cheese Making. These classes of cheese should be highly appreciated in the farmer's home. The farmer's daughter might well devote her attention to this kind of work, which would prove a source of both profit and pleasure.

Moumahaki.

One of the most important features of this year's activity at the Moumahaki Experimental Farm will be the continuance of the tests to determine the effect of green-manuring. These have now been in being for three years. The beneficial effect on the Mouma-

haki soils is indisputable. The green-manuring not only imparts fertility but conserves moisture in the soil, thereby proving valuable in periods of drought. It appears that even the texture of the land is more or less permanently affected. The difficulty is to set out in actual terms the value of the results extending over a period of years.

The lucerne-fields, now about 30 acres in extent, are a demonstration that it is believed will be of very great value to the dairy-farmers of the west coast of the North Island. At this farm the investigating farmer will be able to observe the effect of grazing lucerne, the conversion of it into silage, and the preparation of the valuable hay which this plant affords. Many variety tests are being continued, and valuable work is being done by the plant-breeding officer of the farm in the matter of determining the best varieties for different purposes.

The Department recognizes at Moumahaki, as at other experimental farms, that a dominant industry of the Dominion is milk-production, and the production of fodder crops for feeding to dairy stock will therefore be a feature of the year's activities.

The Ayrshire herd being bred at Moumahaki on milk-record principles is being appreciated, and promises to become the most popular feature of this experimental centre. Selected Shorthorn dairy cows of a distinct milking type will also be included in the dairying operations of this farm. These will be bred to one of the purebred Australian dairy Shorthorn bulls.

Sheep-breeding on a limited scale is being continued at Moumahaki, for here, as at other experimental farms of the Department, it is recognized that it is necessary to have a flock of sheep available if cow pastures are to be maintained in their most profitable condition. To this end it is, of course, desirable that the fields should not be too large.

Clean Milking.—The importance of milking a cow to the last drop is shown by an experiment tried by the Kansas Experiment Station, which dealt with the variations in butter-fat at intervals from the first milk drawn to the last at the same milking. Five cows were used in the test. The first milk drawn contained a very low percentage of butter-fat—only 0·2 of 1 per cent.—and there was a gradual, although not entirely uniform, increase from the first to the last milking, the last sample being exceptionally rich in butter-fat. The importance of milking cows completely is illustrated by the results of this experiment. If the last portions of the milk had been left in the cow's udder in each of the five cases, the percentages would have been reduced from 2·43 to 1·93, from 3·3 to 2·95, from 3·52 to 3·38, from 4·37 to 4·13, and from 3·46 to 3·25 respectively.—*Hoard's Dairyman.*

NEW ZEALAND CHEESE ON EXHIBITION IN LONDON.

D. Cuddie.

New Zealand cheese has been well advertised in London on two separate occasions during the last six weeks. The first instance to which I refer was when the seventy-six crates of cheese sent Home from the last Dunedin Winter Show were displayed in a Tooley Street store under the direction of the High Commissioner for New Zealand. The second display comprised fourteen entries of New Zealand cheese at the dairy show held in the Royal Agricultural Hall, London, from the 21st to the 24th October last.

The Dunedin Show cheese was sent Home at the suggestion of the Department, and included practically the whole of the factory cheese staged at the last winter show held in the southern city. It was of very fine quality. The object in view was to demonstrate to produce-merchants and others at Home what New Zealand could do in the way of manufacturing a high-class article under favourable conditions. Cabled information since received indicates that this end has been gained, the cheese having been favourably spoken of by those who examined it, and commented upon as being close to that of English make.

The cheese displayed at the dairy show at Islington was entered for competition in the colonial classes by dairy companies in New Zealand. Early in this year the Department circularized a number of companies and pointed out that cheese entered at this show would act as a splendid advertisement for New Zealand, as it would bring our produce prominently before those who visit this function from all parts of England and Scotland. Here, again, New Zealand cheese has come in for exceedingly favourable comment, the prize-taking entries being all from this Dominion. The total number of entries in the class was twenty-four, and the awards were as follows:—

Tariki Dairy Company	First.
Kaupokonui Dairy Company	Second.
Hawera Dairy Company	Third.
Taratahi Dairy Company	Commended.
Mangaramarama Dairy Company	Reserve.

Fuller particulars regarding both these displays will no doubt reach New Zealand in due course, and there should be some interesting items for our dairy companies and others who take an interest in our important cheese industry.

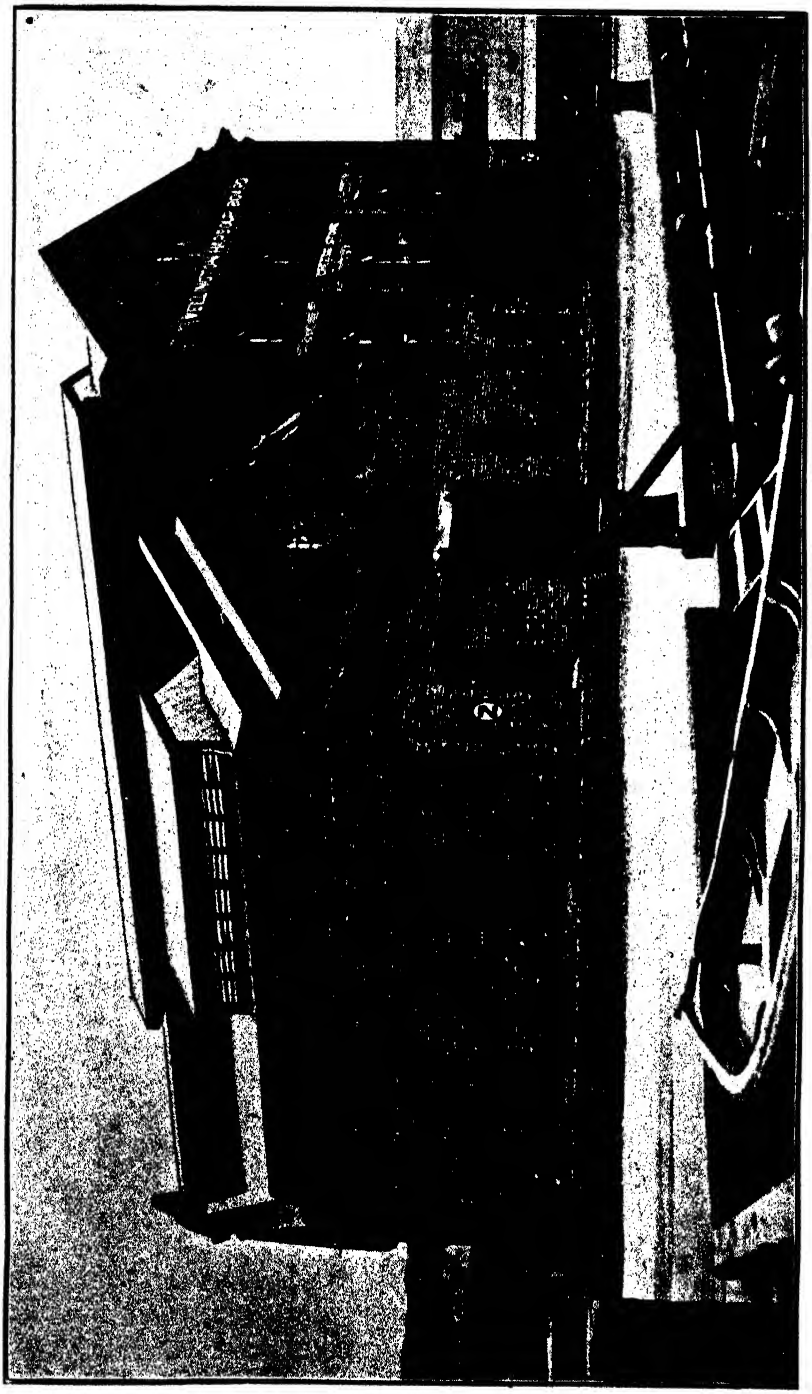
The value of such displays can hardly be overestimated, serving as they do to advertise our produce widely, and also to demonstrate the fact that the cheesemakers of this country can turn out a product of very high quality when they are given an opportunity of doing so.

Of even greater importance to the Dominion, however, is the lesson to be learned at this end from the success which has attended these exhibitions of our cheese in London. When we remember that the whole of this cheese was made from milk which had received proper care and attention on the farms from which it came, and that on this account it was selected by the various factory-managers for the manufacture of these exhibits, it is a "feather in the cap" of those farmers who delivered the milk to the factories. On the other hand, the makers of the cheese deserve much credit, because they have proved in a most emphatic way that when they are given raw material of sound and good flavour they can without doubt do their part in turning out a first-class article.

The main lesson we can learn from these successes is that if all milk-suppliers would give their milk the utmost care and attention from the time it is drawn till delivered to the factories, the makers would then be able to manufacture a product which would enhance New Zealand's name for Cheddar cheese, and in turn increase the market value of our output.

As demonstrating this fact it may be mentioned that the three prize-taking lots of cheese mentioned above have been sold for 90s., 85s., and 80s. per hundredweight respectively. The Mangaramarama entry brought 72s. per hundredweight, and the balance 70s. The prices realized for the Dunedin Show cheese have not been ascertained. These figures constitute a record for the Dominion, and their circulation should have the effect of encouraging dairy-farmers and factory-managers throughout the country to put forth their best efforts to turn out a cheese of similar quality.

The first draft of fifty-three fat lambs from the Ruakura Farm of Instruction was sold on the 8th October at 18s. net, and a small lot at 21s. Half of the flock ewes were mated to a Southdown and half to a Border Leicester. Strange to say, 75 per cent. of this first draft of lambs were Border Leicester cross. In previous experiments the Southdown cross was always the earlier to mature.



THE NEW CHEESE-STORE OF THE WELLINGTON HARBOUR BOARD.

STILTON CHEESE.

Miss G. N. Davies, N.D.D.

Cheese is one of our most nutritious articles of diet, and a good deal of it is made in New Zealand, though up to the present time the chief cheese made in this country is Cheddar. The manufacture of this variety of cheese proves very profitable, and a large quantity is exported. On the other hand, nearly all other varieties, especially Stilton, have to be imported. Why not make the most expensive cheese, and import less or else a cheaper variety?

The manufacture of Cheddar and Cheshire cheese can be traced back for several centuries, but Stilton is comparatively of modern origin. The true origin of Stilton cheese is not agreed upon. Some say it was first made in the Melton quarter of Leicestershire, and sent by the maker to a relative who kept the "Bell" in Stilton, in Huntingdonshire, on the north road between London and Edinburgh. This he supplied to his customers at the price of half a crown per pound; but where it was made was not publicly known. Hence it obtained the name of "Stilton" cheese. Later, however, the place at which it was produced was discovered, and the manufacture learnt by others in the neighbourhood. It was then made in nearly every village in Leicestershire, many tons being produced every year.

That Stilton cheese was first made in Leicestershire and received its name because it was first made known and sold to the general public at Stilton was not universally accepted. At the beginning of last century it was said that the cheese was originally made as well as sold in Stilton, but as the demand exceeded the supply the landlord of the "Bell," knowing the excellent quality of the milk produced in Leicestershire and having some relatives there, sent some one to instruct them in the method of manufacture. In 1730 it was known to be made by a Mrs. Orton in small quantities, and in 1756 it was known to be made only by three persons. The secret of its manufacture was jealously guarded, and any recipe given was, to say the least of it, vague and of little practical use. One given in about 1794 by a maker in Leicestershire to Mr. John Monk, who was sent down by the Board of Agriculture to survey Leicestershire, runs as follows: "Take the night's cream and put it to the morning's new milk, with the rennet; when the curd is come it is not to be broke, as is done with other cheeses, but take it out with a soil-dish altogether, and

place it in a sieve to drain gradually ; and, as it drains, keep gradually pressing it till it becomes firm and dry ; then put it in a wooden hoop ; afterwards to be kept dry on boards, turned frequently, with cloth binders round it, which are to be tightened as occasion requires. N.B.—The dairymaid must not be disheartened if she does not succeed perfectly in her first attempt."

Mr. James Long, in a book entitled "British Dairy Farming," gives a short account of Stilton-cheese making. He states that the system employed is kept very close, and emphasizes the great importance of a constant and precise regulation of temperature. It has often been asserted that the real product cannot be made out of the original district, as the soil and herbage are different from all others. But in spite of this, Stiltons of fine quality have been made far away from Leicestershire. Stilton cheese used to be made from milk enriched with cream—say, the cream skimmed off the night's milk mixed with the morning's milk, and this set for the cheese. However, it is now made from new milk. For this reason, before it acquired its present name, it was often referred to as "cream" cheese.

Stilton cheese is known by its drab-coloured, wrinkled skin, its mould throughout the cheese, and its flavour, which is partly due to the mould. Success in its manufacture depends practically on the normal growth of the blue mould (*Penicillium glaucum*) within the cheese. Stilton comes under the heading of blue-veined cheese, and is not pressed, the whey being removed by gravitation and evaporation. Mould is unable to develop in a pressed cheese because of the impossibility of admitting oxygen from the outside. It cannot grow without oxygen, and it is for this reason that Stiltons, like Gorgonzola, are often made from the curds of two separate milkings, and consequently of different ages. In Gorgonzola, however, the curds are mixed when at different temperatures, one cold and one warm, and in Stilton they are both about 60° F. Curds of different ages do not unite anything like as well as curd produced from one vat of milk at one operation. The result is that, where there is no cohesion and the conditions are perfect, the mould fungus soon commences to grow. In the manufacture of Stilton cheese the most important items are: (1) Judicious handling of milk and curd; (2) thorough knowledge of the work; (3) personal attention to details.

Requirements for a Stilton Dairy.

Accommodation.—Four rooms are recommended for the manufacture of this cheese—viz., making-room, draining-room, coating-

room, and ripening or curing room—though the draining is done mostly in the making-room. This (the making-room) should be heated with hot-water pipes in order to control the temperature, which should be kept at 60° to 65° F.

The coating - room should be airy and well ventilated, but particular care should be taken that there shall be no direct draught on the cheese. The temperature should be 55° to 58° F.

The curing-room should have shutters on the windows and be kept dark, in order to put the cheese-flies at a disadvantage. Great care should be taken to keep these out, as once they get into a cheese they are very troublesome, and do much damage.

Utensils required.

1. Tin vat, usually round, jacketed or otherwise.
2. Tin dipper or scoop.
3. Curd-sink of either glazed earthenware or tin.
4. Draining-sink.
5. Tin with holes in for bottom of sink.
6. Round hoops, perforated.
7. Octagonal-shaped boards for turning cheese, with two pieces of wood on the under-side.
8. Straining-cloths, which should be 36 in. square.
9. Skewers made of steel.
10. Pieces of wood, or frames, for supporting the ends of the cloths in the draining-sink.
11. Reliable floating dairy thermometer. This is a necessity, as a mistake of a few degrees in temperature may make a considerable difference in the character of the cheese.
12. Draining-shelves. These should be rather narrow—say, 10 in. wide—with a groove along one side and a hole in the centre of each shelf for the whey to drain through. Narrow shelves with about 15 in. between each are also required for ripening the cheese upon.
13. A table for turning the cheese on, knife, calico for bandaging, brush for brushing shelves and cheese, measuring-glass, pails, &c.
14. Pure dairy salt. This should always be kept in a pure atmosphere, as it absorbs all surrounding odours.
15. *Rennet.*—In the making of Stilton cheese in Leicestershire there is great prejudice against using any other rennet than home-made, though, generally speaking, rennet-extract is much better strained and preserved than the home-made rennet, which will not keep very long. There seems no doubt that proper renneting plays an important part in the manufacture of Stilton

cheese. Rennet is obtained from the fourth stomach of the calf. These vells are collected from the best butchers and packed in layers of salt in barrels, and are then sent to the persons who dry them and cut them into the form sent out to the cheese-maker. This process occupies some weeks. To keep vells in good condition they should always be kept in a dry place and in a good circulation of air. Tied up in small bundles and hung from the ceiling they will keep good for from one to two years.

Home-made Rennet.—Either dry or wet vells may be used. Cut the vells into small strips, and soak in strong brine of sufficient density to float an egg. For 1 gallon of rennet take six vells and 1 gallon of brine (salt dissolved in boiling water), and cool down to 90° F. Stir carefully every day, and keep in an earthenware jar in a dark, cool place. This can be used in about eleven days, and will keep for a fortnight. Some reasons for using home-made rennet are as follows: It is claimed that a more mellow curd and cheese are obtained, and the cheese, after it commences to go blue, will keep on mellowing down. If extract is used they say the cheese gets drier and harder, owing to the preservative it contains, though the writer has obtained good Stiltons made with either rennet-extract or tabloids. The latter contain less preservative. The strength of home-made rennet is only about one-eighth that of concentrated extract.

To test the strength of rennet: Standard strength is what we compare all others to. In the case of rennet it is: that 1 part of standard rennet shall coagulate 10,000 parts of milk in forty minutes at a temperature of 95° F. In practice 500 c.c., or half a liter, may be used more conveniently than 10,000 c.c. of milk. When 500 c.c. of milk are used only ½ c.c. of rennet is required, and as this amount cannot very well be measured accurately, 5 c.c. of rennet is mixed with 95 c.c. of water, then 10 c.c. of the mixture taken, which will contain ½ c.c. of rennet. Take 500 c.c. of absolutely fresh new milk, and regulate to a temperature of 95° F. Put two or three tiny pieces of straw into the milk; then add the rennet to be tested, and note carefully the time by the stop-watch. Stir well for about half a minute or longer; then note the time taken for coagulation to take place. This may be told by the motion of the straws stopping, or, when straws are not used, by the holding-together of a drop of milk when let fall into a glass of cold water. The time taken in coagulation will be in proportion to the strength of the rennet. If 500 c.c. be coagulated by ½ c.c. of rennet, then 1,000 c.c. will be coagulated by 1 c.c. of rennet—*e.g.*, if the actual time taken be five minutes, with standard rennet, 10,000 c.c. of milk would be coagulated at a tem-

perature of 95° F. in forty minutes; therefore 1,000 c.c. of milk would be coagulated at the same temperature in four minutes. If in five minutes 1,000 c.c. of milk be coagulated at a temperature of 95° F., then in one minute $\frac{1,000}{5}$ c.c. of milk will be coagulated at a temperature of 95° F.; therefore in forty minutes $\frac{1,000}{5} \times 40 =$ 8,000 c.c. of milk will be coagulated at a temperature of 95° F. The strength of the rennet would be 1 in 8,000. This strength has been found very suitable in practice.

16. *Milk.*—Sweet, clean new milk of best quality makes the best cheese. Mr. James Long, in "Elements of Dairy Farming," says that milk intended for conversion into Stilton cheese should never be allowed to lose its heat. Whatever temperature be adopted, the rennet should be added when the exact degree has been reached as the milk, brought direct from the cows and strained, cools. The writer, however, has often made Stilton from pasteurized milk cooled down to 40° F. and reheated to setting-temperature.

Method of Manufacture.

Two-curd System.

When making with two curds there is always the danger of discoloration, as frequently the evening's curd will get too acid, and there will be a marked difference in the curds; also one may be tainted. The milk is renneted, and then the ordinary process gone through. In the evening the curd is cut up into squares of about 4 in., and left overnight in the draining-sink. Assuming that the curd which has already been made was produced from the morning's milk, it is left to ripen until the following day, when curd made from the evening's milk will be ready for mixing and vatting with it. The evening's curd is obtained in a similar manner, and the two curds are exposed until they are sufficiently ripe for breaking, mixing, and salting. It will be noticed that the first curd is exposed to the air for about thirty hours before vatting. The result is that, when ready for breaking, it has acquired a mellowness and acidity which is easily recognized in practice. The two curds are mixed together, and then filled into the moulds in the same manner as in the one-curd system, and the after-treatment is also the same.

One-curd System.

The milk is strained into the vat and regulated to a temperature of from 80° to 85° F., according to the temperature of the dairy and the time of year. Where pasteurized milk is used, starter

at the rate of ½ gill to 12 gallons of milk is added. Rennet is used in the proportion of 1 dram of rennet-extract to 4 gallons of milk. The rennet is well stirred in for four or five minutes, and the milk afterwards stirred on the top, in order to prevent the cream from rising to the surface; otherwise the result will be a loss of fat in the whey. Owing to the low temperature and the comparatively small proportion of rennet, the latter takes about twenty-five minutes to show effect, the time being ascertained by noting the holding-together of a drop of milk when let fall into a glass of cold water.

The curd should now be left for an hour and a quarter to an hour and a half to coagulate. It should never take less than an hour and a quarter. When firm enough and ready for ladling the curd should split cleanly when tried on the thermometer or finger. With a sharp-edged scoop ladle about 2½ to 3 gallons of curd into each straining-cloth, the cloths having previously been placed in the curd-sink. In summer, if a large quantity of curd is ladled into one cloth it is apt to set up too much acidity before the whey is sufficiently drained.

Let the curd remain in the whey for one hour; then loosely fold over the corners of the straining-cloth and allow the same curd to remain for another hour. Then run off the whey, and if the curd be inclined to be acid leave the plug of the draining-sink out so that the curd will keep on draining. On the other hand, if the curd be inclined to be sweet, replace the plug and leave in the "second" whey for another hour. The whey is run off when showing 0·12 to 0·13 acidity.

The bundles of curd are tightened very gradually about once every hour until the curd is firm enough. There is a great divergence of opinion as to the tightening of the straining-cloths. Some makers use scarcely any pressure at all and tighten the straining-cloths as little as possible, whilst others tighten the cloths at frequent intervals. Great care must be taken not to press or crush the curd unduly, or the whey will be white, owing to a loss of fat in it.

When showing 0·18 to 0·2 acidity the curd is turned out of the cloths, and when showing 0·28 to 0·3 acidity it is cut into cubes of 2 in. square to assist drainage. When the acidity is 0·33 to 0·35 the curd is ready for breaking up and salting. Stilton curd should be broken up with the hands into small pieces the size of walnuts, and salt added at the rate of 1 oz. to 3 lb. of curd.

It is moulded at different degrees of moisture, but double the quantity of milk in pounds of curd, or rather under, is liked. Twelve gallons of milk = 20 lb. to 24 lb. of curd.

When vatted the curd should drain freely at once; but if vatted when too sweet it will not drain freely for two or three days. When thoroughly mixed and salted the curd is put into the cheese-hoops, which are placed on calico mats on octagonal-shaped boards. The fine curd is put at the top and bottom of the hoop and the large pieces in the centre, and the curd is never pressed into the hoops. The moulds may be filled to the top or even higher when a small hoop is fitted in. If only filled to the top the cheese may be turned at once by placing a piece of calico and a board on the top of the mould and turning over, or if filled higher than the top of the mould the cheese must be left for one or two hours before turning. The cheese is always turned by the boards until the coat is thoroughly hard, and as long as it is in the draining-room. It requires considerable practice to turn the cheeses properly so that the edges do not get broken off.

Draining.—The cheeses should be turned every day, and at the end of seven days be ready to be taken out of the mould. If ready in four days the cheese is too acid, and if in nine days or longer it is too sweet. During the draining period, if the weather becomes too cold or the temperature of the room drops, the cheese will stop draining and swell over the top of the mould. However, if carefully turned and skewered they will get all right again in a few days, but will probably get a bad shape in the ripening-room. Afterwards the tops dent in, and are liable to go brown inside. A hard, chalky cheese will be ready to come out of the mould in about four days. In this case the curd is too dry, and the cheese will weigh about 5 lb. less than it should, though it will be a good shape and have a fine crinkle.

Bandaging.—When ready for scraping the cheese should have rather an elastic feel, and it should have slightly left the sides of the hoop, which can easily be moved up and down the cheese. The hoop is now removed and the sides of the cheese scraped up and down with as little friction as possible, a table-knife being used for the purpose. All small holes and cracks should be filled in, and the sides of the cheese should be smooth and even. The calico binders, which are folded over at each end and are a little longer than the cheese, should now be pinned round. The moulds are thoroughly washed, and the cheeses put back into them. This is done for two or three days. Then the hoops are removed. Every day clean, dry bandages are pinned round the cheeses, which are replaced on the draining-shelves. If left too long before scraping a rough coat forms. The bandage should be kept on until dry patches appear on it, and the coat commences to form. After this takes place bandaging ceases, and the cheeses are removed to the coating-room.

Coating.—The coating-room should be airy and kept at a temperature of 55° to 58° F. Slip-coat Stiltons are often caused by keeping the mould on too long, and keeping the air from the cheese. Also in damp, thundery weather a soft, greasy coat will sometimes form, instead of the true coat. This must be scraped off at once, and the cheese removed to a drier place. In very hot or thundery weather the coat of a Stilton can be spoiled in two or three days. Following are the causes of a cheese not coating well :—

1. Hot, thundery weather will cause the outsides of the cheese to become quite greasy.

2. Sweet curd will not coat as well as acid curd.

3. Cheese being handled on the outsides.

In about a month the coat will have fully formed. Then the cheese can be removed to the curing-room, which should be kept at a temperature of about 60° F.

The Curing-room.—This room should be kept dark in order to put the cheese-fly at a disadvantage, and the atmosphere should be kept slightly humid, or a loss of weight may follow. Moisture is essential to perfect consistence, hence the importance of preserving it. To hasten the ripening of cheese the temperature of the room may be raised to 65° F., and the cheeses skewered after they have been a month in the room. They may also be covered over with damp cloths.

INSECT PESTS.

The Cheese-fly (Piophila casei).—The fly is often a source of unlimited annoyance in the curing-room, and if methods of control are not promptly adopted when this unwelcome visitor is first observed considerable loss may be occasioned thereby. The maggot or larva of the fly, too well known to the cheesemakers as "jumpers" or "skippers" to require further description, spoil the cheese by their excretional deposits. The adult insect is a small, black, shining fly about $\frac{3}{16}$ in. in length, with transparent wings. Cracks and holes in the surface of the cheese offer desirable conditions for the deposition of eggs. In from two to four days the maggots hatch out. After feeding for about ten days the maggot assumes the pupal stage, in which form it may be observed as a small golden-coloured chrysalis, from which after a further ten days the perfect fly emerges ready to recommence the life cycle. About three generations are produced each season. When a cheese is attacked by a fly it should immediately be removed from the cheese-room, and any crevices in the walls or floor should be filled with red-lead.

Cheese-mite (Acarus domesticus).—A true mite, which causes the wasting or crumbling of the coats of cheese. These mites are found in large quantities in the brown dust brushed off Stiltons, but when seen under the microscope the mite is an almost colourless insect. Mites should be brushed off the shelves, also off the cheeses themselves when turning them every day. When the mites get too numerous brush the cheese and put into a cloth; then dip into hot water for about ten seconds and afterwards place in the open air to dry. All shelves should be well scrubbed.

Ripening.

Cheese is ripened by the growth of mould and bacteria, and also by enzymes, which make the curd soluble and easy of digestion. Pasteur has termed microbes "germs of putrefaction." Their work, however, in the process of decomposing curd is beneficial to the manufacturer, as the changes which occur between the raw curd and ripened cheese are owing to the fermentation produced by the microbes within it.

Mould.

Moulds are parasitic plants which are always present in the atmosphere of the dairy and to which the decomposing curd of a ripening cheese acts as soil. The growth of mould depends upon congenial conditions—namely, air, warmth, and humidity. The mould influences the character and flavour of the cheese, but the ripening is not entirely owing to its work. In Stilton cheese mould is encouraged to grow by the careful provision of conditions agreeable to its requirements—acidity, moisture, and air-space. The pieces of curd, failing to unite, leave air-space through which the mould spreads. The predominant growth of the blue mould (*Penicillium glaucum*) is owing, doubtless, to the fact that it is the dominant fungus in the atmosphere of the dairy, and that it will grow at a comparatively low temperature.

A Stilton cheese should be ripe and ready for eating in five to six months, and a good cheese should keep for six months after it is ripened. The coat of a Stilton is light drab in colour and crinkled, but they vary considerably, some being almost smooth, whilst others seem quite rough. When ripe the cheese should be veined throughout.

This is the day when breeders of dairy cattle are endeavouring to apply the same business methods to their employment as the men behind the counter do to their vocation.—*Annual Report of the Ontario Department of Agriculture.*

STORAGE OF POTATOES.

A GOOD NATIVE FARMER'S METHOD.

Geo. H. Davies, Karori.

The method of storing potatoes adopted by a half-caste farmer at Pukerua is so novel and at the same time so effective that a description of it will, no doubt, prove of interest to the readers of the *Journal of Agriculture.* Last season on his well-managed little sheep-farm he planted 2 acres of freshly ploughed land in potatoes. The portion that had been planted with Derwents was a failure owing to the potato-blight. The remaining portion of the crop, consisting of two other varieties, had been taken up and stored in what to me was quite a new and certainly a most effective way, instead of being stored in a shed or pit.

Corner posts, 17 ft. apart one way and 5 ft. the other, were sunk into the ground; on these a frame was built, length about 17 ft., width 5 ft., depth 2½ ft., height above ground 4 ft. The bottom of the frame was floored with slabs some 2 in. apart; this was then covered with an inch or so of manuka scrub to prevent the potatoes from falling through. The sides and ends were enclosed by rails or battens nailed to the corner posts so as to enclose more manuka scrub, which was further secured by a stay or two in the middle, let into the ground for extra stability and support to the structure. (It would be a good idea, where rats are likely to give trouble, to tack tin around the supporting-posts.)

The potatoes were then stored therein, those that were selected for seed being placed in kits, and the whole covered over with about 6 in. of loose fern. The explanation given was that the potatoes did not heat, and, being fully exposed to the wind and air, no matter how heavy the rain, they soon dried. My informant told me that he had seen potatoes so stored at Parihaka in June last, and that they were quite sound then. A ton and a half of the potatoes that I saw so stored have since been sold for £15 per ton. I examined these potatoes and found them to be quite sound. From their appearance I should say that one of the two varieties was very like the Dakota Red, which, I have heard, is a sturdy grower and a good blight-resister. I have been informed on very good authority that the Improved Dakota Red is almost immune

from potato-blight. Not having seen it, I cannot say whether the potato mentioned above is the same or not. The other variety was one quite new to me, being what they call a Maori potato known by the name of "Huakaroro" (*i.e.*, "Seagull's egg"). It is, strange to say, a dark-skinned potato, with occasional white markings, and is said to be a good cropper. The Maoris who have grown it assert that it is blight-proof.

In connection with this method of storing potatoes it would prove a most interesting experiment to store apples in the same manner, having the structure divided into compartments where storage is required for different varieties.—*Maori Census, 1906.*

CLOVER AND COW-GRASS ON DREDGED LAND.

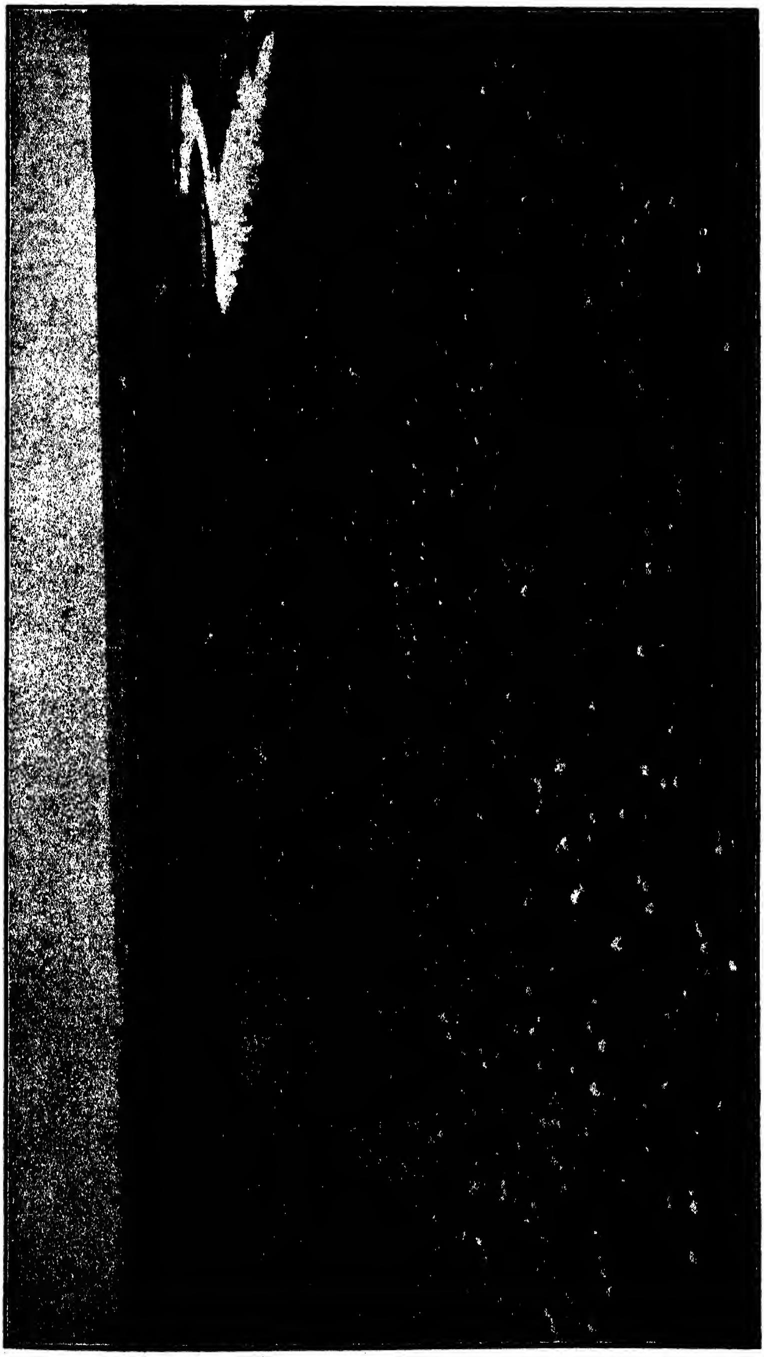
B. Grant.

The accompanying illustration shows a portion of a field of clover and cow-grass of 100 acres grown by Mr. John Turnbull, of Waikaka, on land that has been dredged.

Before dredging the area was good agricultural land, typical of the country in the Waikaka Valley. After the land had been dredged it was harrowed and given a seeding of 3 lb. of cow-grass, 1 lb. of white clover, and 20 lb. of rye-grass per acre. In six months' time it was stocked. When the photo was taken the pasture had been down for four years, and had always been kept well stocked.

The paddock has now been down in pasture for nine years, and still grows excellent cow-grass and white clover, but the rye-grass has practically disappeared. Mr. Turnbull informs me that in wet seasons, while his other grass paddocks are wet and hold the water, this paddock is always practically dry on the surface, the dredging having improved the drainage. This is a good example of what can be grown on this class of land.

"I am convinced that the failure of farmers to study and practise co-operation is the chief cause of these excessive middle profits," said Sir Horace Plunket to the Nebraska farmers. "It is not essential that farmers should sell their own produce to the consumer, but it is essential that they should be so well organized that if they cannot get their food to the consumer with a reasonable charge for distribution, they should be able to establish distributing agencies of their own. Until they do this producer and consumer will both be fleeced."—*Spokesman Review.*



Cow-grass and Clover growing on Land that has been dredged.

POTATOES.

VARIETY TEST AT WAITAKI BOYS' HIGH SCHOOL.

H. H. Allan.

Following is an account of a potato variety test conducted at the Waitaki Boys' High School, Oamaru :—

Twelve varieties, kindly supplied by Mr. McGowan, of Willowbridge, were tested. Thirty-six tubers of each variety were placed in shallow trays on the 20th August, 1911, and set out to receive the sun.

The land chosen was weeded and dug and hoed on the 11th October, a moderate dressing of stable manure was dug in, and the potatoes were planted on the 15th October. The sets were then well greened and had developed short, strong shoots. The sets (whole) were placed 1 ft. apart, 6 in. deep, with 2 ft. 6 in. between rows.

Plants in plots 11, 12, 10, and 7 were up by the 10th November, having appeared in that order. All plants were up by the 18th November. They received intercultivation during the whole period of growth, and were hoed up on the 24th November, and also on the 2nd December. The plants were dug on the 30th July, 1912. The results were as follows :—

Plot.	Variety.	Yield per Acre (in Tons).		
		Marketable.	Small.	Total.
1	King Edward VII	4·5	2·1	6·6
2	Daniel's Sensation	3·9	2·3	6·2
3	Solanum Commersonii ..	1·0	1·1	2·1
4	Cliff Kidney	3·2	2·6	5·8
5	Black Skerry	9·6	3·9	13·5
6	Princess Victoria	3·4	1·9	5·3
7	Irish Queen	7·8	4·1	11·9
8	Robin Adair	1·6	1·7	3·3
9	McGowan's Early	5·1	2·1	7·2
10	Gamekeeper	3·5	7·2	10·7
11	Southern Cross	5·6	8·6	14·2
12	Dalmeny Beauty	9·3	6·1	15·4

Southern Cross retained its haulms much longer than any of the others. The great preponderance of small tubers in the Game-

keeper and Southern Cross varieties will be noticed. The plants were unsprayed, but did not suffer from blight. Only Southern Cross and Irish Queen, however, were perfectly free. Most plots were attacked slightly by scab—Irish Queen rather badly; while Black Skerry was particularly free.

BELFAST CO-OPERATIVE EXPERIMENTS.

E. CLIFTON.

THE work undertaken by the Department at Belfast, Canterbury, in conjunction with the Canterbury Frozen Meat Company, is an example of the most valuable type of co-operative experimentation. It conforms almost entirely to the method that has been so highly appreciated in Ireland under the direction of that famous administrator of agricultural development, Sir Horace Plunket. Experimental plots were undertaken under the control of the Irish Board of Agriculture. They were located at convenient country centres, principally where farmers foregather. They exemplified the experiments most in demand in the particular district in which they were located. We have practically similar conditions in connection with the experiments at Belfast, a centre where many of the farmers of North Canterbury have business to transact and thereby have a good opportunity to investigate the work in the experimental fields. The whole of the operations are under the personal direction of Mr. Arthur P. Hopkins, the Manager at Belfast, who is an enthusiast in the work, co-operating in the most complete harmony with the Fields Instructor of the South Island, Mr. A. Macpherson. Mr. Hopkins's services are always at the command of visitors, and, realizing as he does the value of complete data, he is always in a position to give exact information in regard to the experimental work in progress.

The experiments cover many descriptions of root crops, chiefly mangels, swedes, turnips, and carrots. With regard to fodder crops, silver-beet has made the Belfast plots famous. In the opinion of Mr. Hopkins this plant is proving the most valuable of all plants that have lately been included in the farm economy. Chou moellier is another crop which has been tested well with excellent results at Belfast. Lucerne of several varieties is also being grown, and well merits the most careful attention of visiting farmers.

Originally the plots at Belfast covered some 14 acres. Now they embrace a further area of 10 acres, or, in all, 24 acres.

TOAD-FLAX (LINARIA VULGARIS).

A. HUGHES.

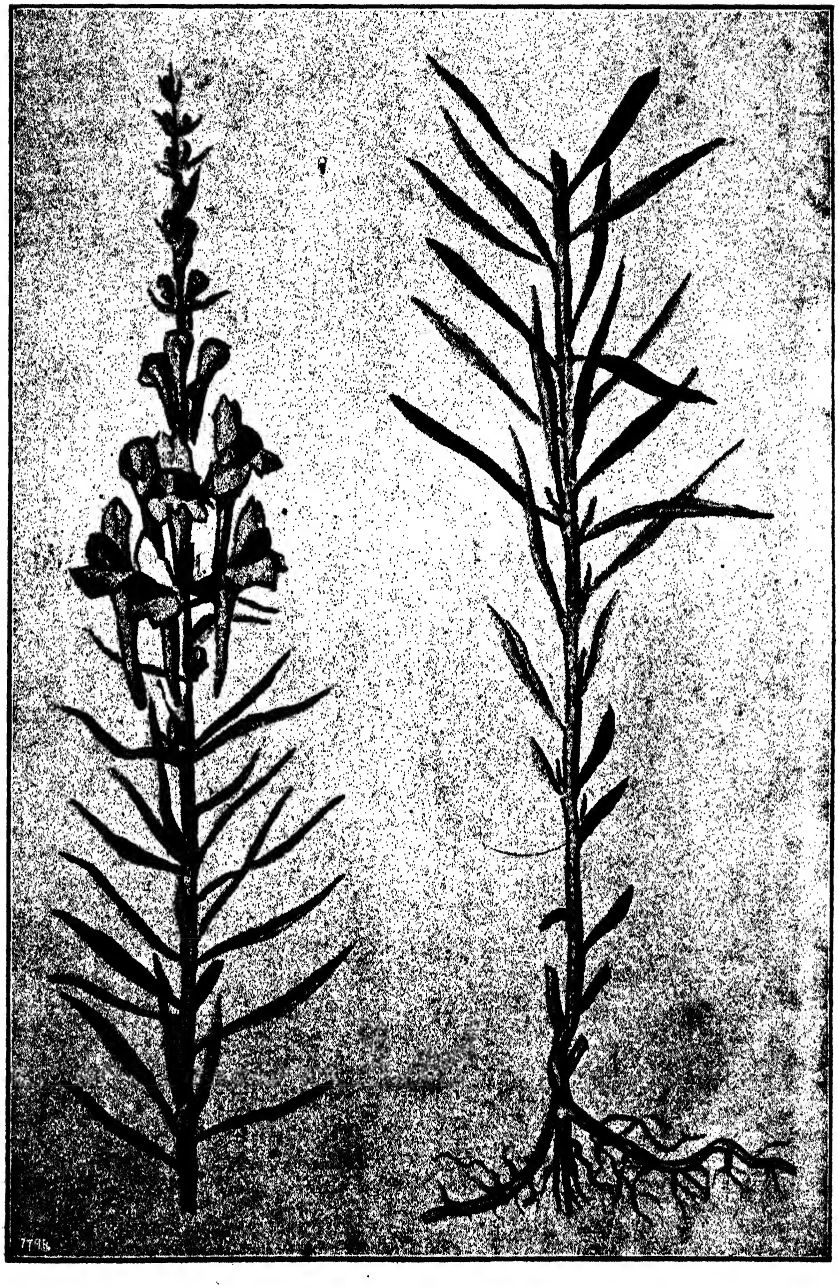
THIS is a weed that I have found growing in each district in which I have been stationed—viz., Southland, Otago, and North Canterbury. It is a European plant, and grows upright to the height of 2 ft. or 3 ft., with lance-shaped leaves, which thickly cover the stem. The flower is of a light-yellow colour, with a dark-yellow mouth, and is very much the shape of a snapdragon, but has a spur at the base of corolla.

It increases from the root, which runs along the ground, and from seeds. A very peculiar feature often seen in this plant is the five spurs and five (unequal) imperfect stamens.

It is said to have purgative properties, and a decoction made from this plant is said to be a good poison for flies.

It is often cultivated in flower-gardens, until it is found to be taking possession. It is then pulled up and carelessly thrown on the rubbish heap or over the hedge to take root and become a thorough nuisance. To give some idea of how this weed will spread, there was a paddock of 20 acres in Rangiora that I am informed had only a few plants in it sixteen or seventeen years ago. When I came here, the plant covered between 30 and 40 acres. If pulled up before it is thoroughly established there is not much difficulty in keeping it down, but once it gets a firm hold and is allowed to seed it will be found far more difficult to eradicate.

Soil-inoculation for Alfalfa (or Lucerne).—It is so easy and inexpensive to secure thorough inoculation that no one can afford to neglect this essential feature. A good method: Take 1 quart of soil containing the active nitrogen-gathering bacteria. This may be found beneath healthy sweet-clover or alfalfa plants. (2.) Dry this soil in the shade, then make it into a fine dust by grinding between a brick and a smooth board. (3.) Take 1 lb. of ordinary furniture-glue and dissolve it in 3 gallons of water. Wet the alfalfa-seed with the solution, then add the dust; mix well so that every seed is covered with the dust; dry, and the seed is ready for sowing. The entire process must be accomplished in the shade, as bright sunlight is fatal to the bacteria. Even those who know their land is inoculated cannot afford to neglect this, because it puts bactera on every seed where they will be ready to assist the young plant the moment it starts.—*Hoard's Dairyman.*



Toad-flax (Linaria vulgaris).

TESTING BUTTER FOR SALT.

W. E. Gwillim.

In the past the testing of butter to ascertain the content of salt has been considered scarcely necessary, buttermakers having succeeded in leaving sufficient salt in their butter to please both the local and the usual overseas markets. The recent demand from the United States for high-grade creamery butter without preservative and containing a specific and higher percentage of salt than is usually made, and the examination of butters forwarded to meet this requirement, evidences the necessity for those buttermakers who would cater for this new and promising market giving this matter their careful attention.

In the butters examined it has been the exception rather than the rule for the content of salt to vary considerably. The variations have been as wide as from about one-half below to one-half above the percentage required. The irregularities have not been confined to any particular brand, and have been as much in the successive churnings of a day's make of a single brand as otherwise. It is evident that to ensure regularity the content of salt must be ascertained and adjusted before the making of the butter is completed in the churn.

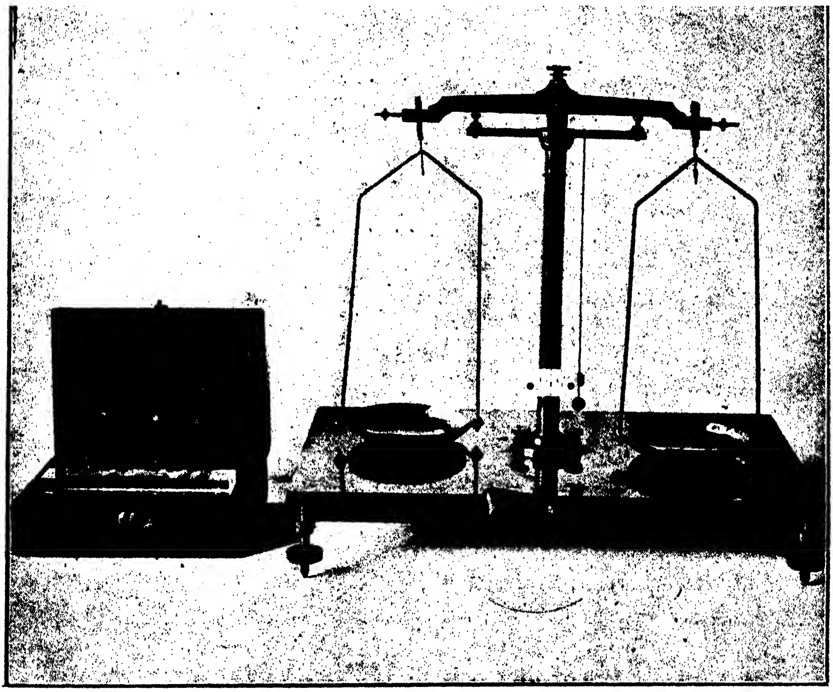
The determination of the salt-content is hardly of less importance than that of the moisture-content, and both tests can be made at the same stage in the process of the making of the butter.

No practical objection can be taken to incorporating more salt than usual to meet the expressed wish of the buyer. Extra salt will not necessarily reduce the quality of the butter in the estimation of the grader; neither will it prevent the incorporation of a standard quantity of moisture, nor increase the cost of production.

The inclusion of a specific amount of salt, or within a narrow margin of it, presents no great difficulty to the competent buttermaker, nor does it entail much extra expense. However similar to the incorporation of a definite amount of moisture, it means the abandonment of guesswork and rule-of-thumb methods in favour of exact work on scientific lines. Moreover, the extra time and money spent on the testing is more than counterbalanced by the value of the increased yield of butter due to the extra salt incorporated. This

latter consideration may have the effect of tempting some makers to crowd as much salt as possible into the butter. It is, however, to be hoped that they will see the wisdom of not overstepping the limit agreed upon.

No buyers appreciate good butter more than Americans, and none are better able to pay for it. To supply them with what they want is the surest way to win business well worth having.



(*a*)

CHEMISTS' BALANCE AND SET OF GRAM WEIGHTS.

There are several practical methods for ascertaining the salt-content in butter, and one of the simplest and best is that described in a bulletin of the Wisconsin University entitled "A Determination of Salt in Butter at the Creamery," by J. L. Sammis.

The following is largely a condensed restatement of the method with a few items garnered from experience in the use of the test. Many of the appliances required are employed in various tests carried out at most butter-factories, and the other appliances are readily obtainable for a small outlay.

The Wisconsin Test for Salt-content of Butter.

The basis of the test is that a definite quantity of a standard solution of nitrate of silver will neutralize the salt present in a definite quantity of brine. The test is operated by taking a measured sample of watery solution (principally brine) made from a weighed sample of butter and titrating with the standard nitrate-of-silver solution, using potassium chromate as an indicator. The volume of solution used to effect neutralization is equivalent to the percentage of salt in the butter.

Requisites for the Test.

The appliances required are,—

(*a.*) Chemists' balance to weigh 50 or 100 grams, and a set of gram weights.

(*b.*) Burette, with glass-stoppered tap, of 20 or 25 c.c. (cubic centimetres) capacity, graduated to 1 c.c. divisions, each subdivided to one-tenth of 1 per cent., and fitted to a stand.

(*c.*) Graduated measuring glass or tube, about 12 in. by 1½ in., of about 250 or 300 c.c. capacity.

(*d.*) Glass beaker of about 100 c.c. capacity.

(*e.*) Measuring-pipette graduated to 17·6 c.c.

(*f.*) Dropper bottle of 30 c.c. capacity for holding "chromate indicator."

(*g*) White-glass pint-size wide-mouth bottle for holding dissolved sample of butter (an ordinary milk-bottle is suitable).

(*h.*) Brown-glass half-pint-size wide-mouth bottle with tight-fitting glass stopper for holding nitrate-of-silver solution.

(*i.*) Thermometer.

The chemicals required are,—

(*j.*) A supply of nitrate-of-silver solution, prepared by dissolving 5·1 grams of crystallized nitrate of silver in 250 c.c. of water.

(*k.*) A supply of chromate indicator, prepared by dissolving about 7·25 grams of potassium chromate in about 25 c.c. of water.

Instructions for making the Test.

1. Balance the beaker on the scale by means of a counterpoise.

2. From a representative sample of butter accurately weigh 10 grams of the butter into the beaker.

3. Carefully measure 250 c.c. of water, at a temperature of about 100° to 120° F., into the graduated measuring-tube.

4. Wash the butter out of the beaker with some of this water, and transfer same, together with the balance of the water, without spilling any, to the white-glass bottle, which will then contain 10 grams of butter and 250 c.c. of water.

5. Shake the bottle until all the butter is dissolved. Then let stand for a few minutes for the butter-oil to separate and collect on the top of the watery solution. Repeat the shaking to ensure even distribution of the salt in the water, and again allow the oil to rise and settle.

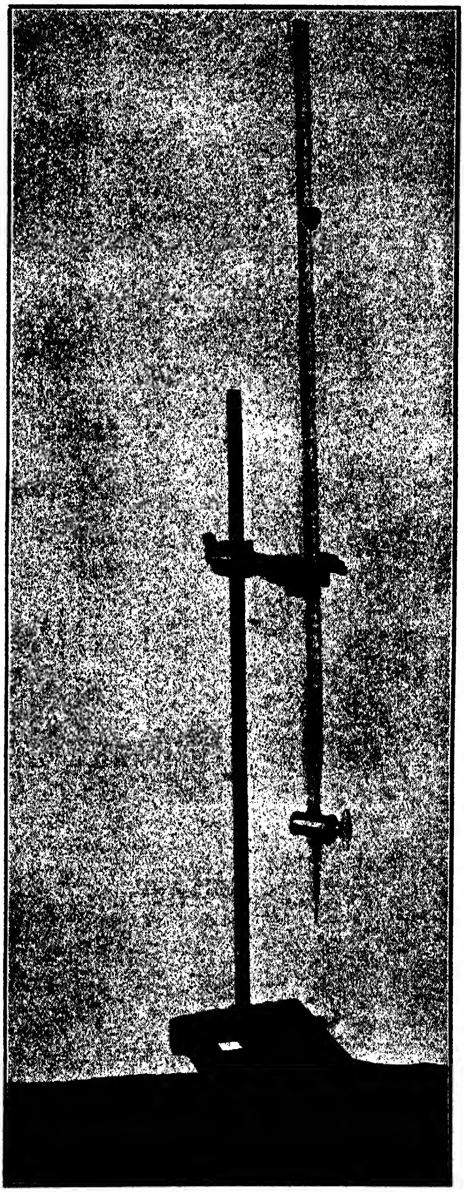
6. Fill the burette with nitrate-of-silver solution.

7. Take the 17·6 c.c. pipette and fill with watery solution from below the butter-oil, and transfer to the beaker.

8. To this add one drop of chromate indicator, and shake to mix in.

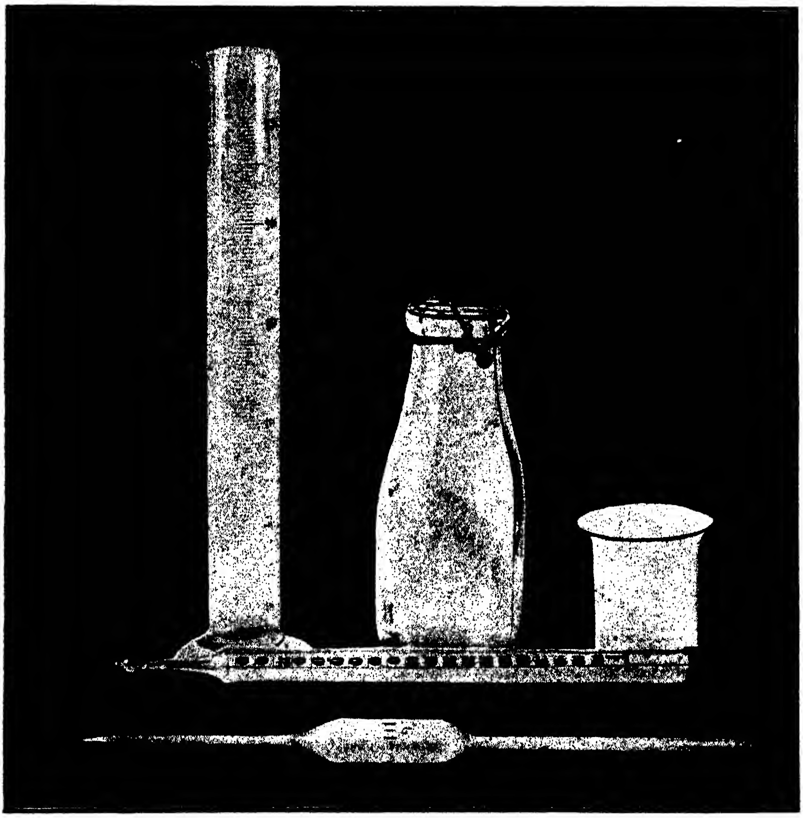
9. Place the beaker on a white surface (a piece of paper will do) below the tap of the burette. Open the tap and allow the nitrate-of-silver solution to drop into the contents of the beaker, at same time shaking the beaker. Cease adding solution when a permanent faint red colour is obtained. The content of salt is then neutralized.

10. To read the content: The c.c. of nitrate-silver solution used represents the percentage of salt. Thus 3·1 c.c. of solution used is equal to 3·1 per cent. of salt.



(*b*)
25 c.c. Burette and Stand

The method of testing is very similar to the "alkaline" test for ascertaining the acidity in milk, &c. A little practice soon makes the operator proficient. The beginner should test samples in duplicate. The test takes only a few minutes to perform.



(c) (d) (e) (g) (i)
250 c.c. Measuring-tube; Pint-size Bottle for dissolving Sample of Butter; 100 c.c Glass Beaker; Thermometer; and 17·6 c.c. Pipette.

Some Notes on various Features of the Test.

The Chemicals.—These should be of the best quality, and should be kept protected from light, dust, and moisture. Supplies packed in tight-fitting glass-stoppered bottles containing 1 oz. and upwards, as put up by the manufacturers, can be obtained from reputable dealers. The crystallized nitrate of silver should be "chemically pure, containing less than 1 per cent. moisture." Triple crystallized nitrate of silver has been used successfully. The potassium chromate should be "chemically pure, free of chlorides." The price per ounce of the former is about 2s. 6d., and of the latter about 6d.

The Nitrate-silver Solution.—This should be clear, and with a slight bluish tint. The presence of salt, alkali, or dirt in the water used to make the solution will make the solution milky or turbid and unreliable for use. About 250 c.c. is enough to make at a time. It should be kept in a wide-mouthed half-pint-size brown-glass bottle, with tight-fitting glass stopper. It should not be held in the burette longer than necessary. With due care it will keep good for about two months. It is corrosive, and will stain the skin on contact.

The Chromate Indicator.—About 25 c.c. is sufficient to prepare at a time. When titrating, one drop is sufficient, and on mixing with the contents of the beaker the colour of the liquid becomes yellow. Use the same amount of indicator each time. Where enough is used, the addition of another drop at the close of the titration will produce little or no change in the faint-red colour. If insufficient be used, the addition of another drop will turn the mixture brick-red, in which case repeat the titration, using two drops. If the result should be unsatisfactory make some fresh indicator solution.

The Burette.—The nitrate-silver solution is corrosive, and for this reason the burette is best in all glass. The plug of the tap should be kept lightly greased to ensure easy turning. Burettes with glass tips, rubber-tubing connection, and pinch cock, as employed in connection with the "alkaline" test, may be used, provided a separate piece of tubing be reserved for use with the silver solution. In the absence of a burette, a 10 c.c. pipette graduated in 0·10 c.c. divisions can be effectively used by a careful operator.

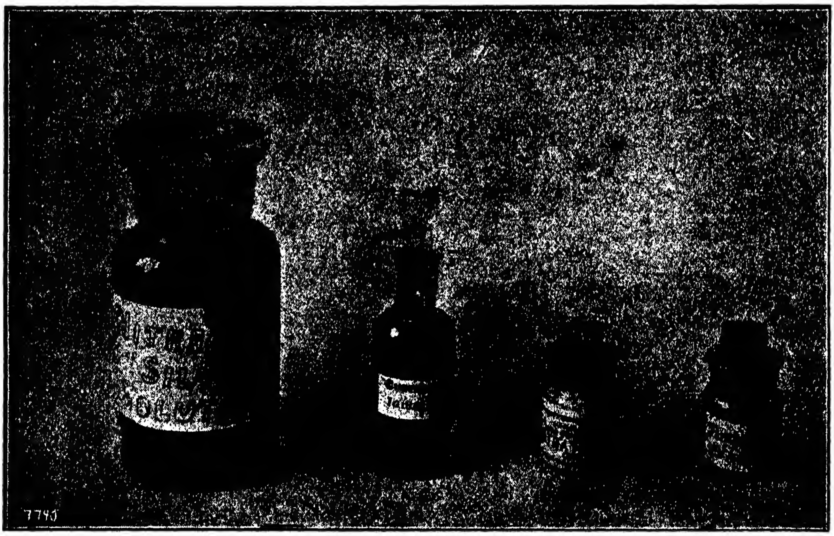
Weighing the Sample of Butter.—In place of weighing the sample of butter in the beaker it can be weighed on a small piece of vegetable-parchment "butter" paper, about 2½ in. square, and placed direct into the "dissolving" bottle. The hot water from the measuring-flask is then poured into it, and the paper withdrawn when the butter is dissolved. In this case a white cup can also be used instead of a glass beaker.

Temperatures.—Always employ the same temperature. The water used should be hot enough to dissolve the butter quickly. A temperature over 160° F. is inadvisable. During the test the temperature of the watery solution lowers and gives cause for a slight error, but is so small as to be negligible. For instance, butter containing 2·5 per cent. salt would appear at most to contain 2·55 per cent.

Curdy Appearance during Titration.—Owing chiefly to possible variation of temperature of the watery solution during titration,

some of the contents of the beaker appear on occasions to curdle. This is of no consequence, since the end of the test is known by the appearance of a faint but permanent red colour produced by the last drop of the silver-solution used. This faint red colour is looked for whether curdling takes place or not.

Accuracy of the Test.—If the instructions are properly carried out, no error greater than 2 per cent. is likely to occur. Thus, if butter



THE CHEMICALS.

Brown-glass bottle for nitrate-of-silver solution; 30 c.c. dropper bottle for chromate indicator; 1 oz. bottle of crystallized nitrate of silver; 1 oz. bottle of potassium chromate.

contains 4 per cent. the error need not be over 0·08 per cent. There is no special need for greater accuracy than this.

CAUTION.

Handle the chemicals with care. Label bottles containing them with name and nature of contents. Keep them out of the reach of children at all times, and under lock and key when not in use.

Herd-testing.—Every year I continue weighing and testing I am more convinced of its immense benefit. My cows at the present time are giving an average of 4 gallons, and the test for the past month will average 4·1. Considering that the land here is not like the south Taranaki land, that only one expensive cow has been bought, and that the rest have been bred up from the proved best cows of an ordinary herd, it speaks volumes for the practice.—*James Burgess, Warea, Taranaki.*

BASIC - SLAG - SUPERPHOSPHATE MIXTURE.*

B. C. Aston, F.I.C.

Top-dressing Pasture.

I drew attention on page 312 of the September number of the *Journal* to the use of basic-slag-and-superphosphate mixture on pumice soils. The difficulties in connection with mixing and distributing the mixture are such that it is advisable to have an alternative method of procedure which retains the features of the mixture while disposing to some extent of the difficulties. This is effected by distributing the slag first and the superphosphate subsequently, but as soon as possible afterwards. It is desirable that the basic slag should be applied before the superphosphate instead of working in the reverse order. The advantages of the mixture may be attributed to the constituents of the two fertilizers working in conjunction, and hence it is advisable that they should come into contact in the soil. The slag is insoluble in water, but the superphosphate is soluble, hence it is easy to see that the superphosphate has a better chance of coming into contact with the slag if the superphosphate is on top.

Whether the application of the two fertilizers singly to a pasture will be as efficacious as if they were mixed before distribution is impossible to predict without the knowledge that exact experiments will give, but one can at least say that there is every indication of the mixture proving superior to the individual constituents applied alone in the same quantity to the light northern soils which respond to phosphates.

One experiment was inspected in which (1) 4 cwt. slag, (2) 4 cwt. superphosphate, and (3) 2 cwt. basic slag and 2 cwt. superphosphate were applied to three different paddocks. The last-named has given the best-looking pasture, and cattle allowed the range of the three paddocks showed undoubted preference for that dressed with the mixture.

Drilled in with the Seed.

As the turnip-planting time is now approaching, it is as well to call attention to the good results which have followed the applica-

* Bulletin No. 26, on "Basic Slag," should be read in conjunction with this article.

tion of basic-slag-and-superphosphate mixtures to turnip crops. Mixtures of 2 cwt. basic slag and 1 cwt. superphosphate per acre, drilled in with the seed, have given excellent results, even when the mixture has heated after mixing. A mixture of bonedust, superphosphate, and basic slag in equal parts should be experimented with, taking care to mix only small quantities at a time. Theoretically such a mixture would be a good one, as the bonedust should improve the mechanical state of the fertilizer, enabling it to run through the drill more easily, while the acid nature of the superphosphate should prevent the alkaline basic slag from reacting with the nitrogenous matter of the bonedust, and consequently would prevent the loss of ammonia which otherwise might result.

ARATAKI EXPERIMENTAL FARM.

Mr. W. H. Taylor, Horticulturist at the Weraroa Experimental Farm, and the author of the "Farm Garden" notes of the *Journal of Agriculture*, has been appointed Manager of the Arataki Experimental Farm in Hawke's Bay. Here the work is entirely horticultural, and the skill, experience, and enthusiastic interest of Mr. Taylor in all matters pertaining to horticulture will have full scope. In proposing this appointment the Department was actuated by the fact that Mr. Taylor's special knowledge would be of great value to the Hawke's Bay District, where fruitgrowing is becoming a prominent industry of the soil. Mr. Taylor has already taken up his duties at Arataki.

At the present time the Weraroa Experimental Farm, comprising 800 acres of land, of which 640 acres are available for use, is carrying 4,100 sheep, 150 head of cattle, and 24 horses.

Last year Domino III, two of whose grandsons sold for 250 guineas and 130 guineas, respectively, at the Weraroa sale of milk-record Holstein bull calves, gave 22,061 lb. of 3·57 milk and 787·58 lb. of butter-fat. The New Zealand record for butter-fat production, made under semi-official test, conducted for the first time last year, is held by Mr. J. C. N. Grigg's Holstein cow Netherlands Queen VII, which gave during the past season 659·31 lb. of butter-fat. The world's butter-fat record is held by the American Holstein cow Bannostine Belle de Kol, which, under official test, produced 1,058 lb. of butter-fat. It should be noted that the New Zealand cows made their records under absolutely natural grazing-conditions, without either special feeding or stalling, being at pasture the whole season. In the case of the American cow, stalling and feeding were a feature of the management.

WERAROA MILK-RECORD HOLSTEINS.

ANNUAL SALE OF BULL CALVES.

THIS year's sale of the Department's annual draft of milk-record Holstein bull calves was held for the first time where the calves were bred—at the Weraroa Experimental Farm. Buyers attended from many parts of the Dominion, and the bidding for sons of exceptional producers, especially where these were high-testing cows, was very keen. The sale being held on the farm gave intending purchasers opportunity to inspect the parent stock. This and the year's milk-record of each dam being available, they were enabled to have the information desired in purchasing pedigree dairy bulls. The visitors were enthusiastic in their praise of the herd, and were impressed with the robust character of the young bulls and the condition in which they were offered.

The Weraroa sales are characteristic of what may be expected in the future—that the sire exemplifying sound constitution will be descended from stock of milk-record quality, and the average price will be within the means of the ordinary dairy-farmer. It is realized that high prices will continue to rule, and even advance, for exceptional animals, members of fashionable families, as exemplified by the Domino strain. These will be paid by breeders of purebred stock. In the future, however, even more than at the present time, the majority of the bulls offered, as was the case at Weraroa on the 4th instant, will be at prices within the reach of the dairy-farmer.

The twenty Holstein bull calves sold realized an average of just under 80 guineas, the gross return being £1,662 13s. Following are the bulls sold, with the prices realized and the names of the purchasers:—

Dominion Garfield, by Sir de Kol Inka Pietertje (imp.)—Lorene (imp.), which gave in 249 days 6,498 lb. of 2·7 milk and 175·446 lb. of butter-fat.—W. Galloway, Pahautanui, at 36 guineas.

Dominion Van Dieman, by Oak de Kol 2nd Homestead Fobes (imp.)—Lenore, which gave in 365 days 14,604 lb. of 3·25 milk and 474·81 lb. of butter-fat.—McIntyre Bros., Morrinsville, at 65 guineas.

Dominion Royal Oak, by Oak de Kol 2nd Homestead Fobes (imp.)—Diana, which gave in 365 days 13,165 lb. of 3·18 milk and 418·34 lb. of butter-fat.—G. D. Goodrich, Taihape, at 65 guineas.

Dominion Marlo, by Oak de Kol 2nd Homestead Fobes (imp.)—Chloe, which was not milked during the 1912–13 season, but is now giving 60 lb. of milk a day.—R. Burke, Matamata, at 36 guineas.

Dominion Nikau, by Oak de Kol 2nd Homestead Fobes (imp.)—Thelma, which gave in 365 days 10,687 lb. of 3·28 milk and 350·27 lb. of butter-fat.—J. Nesbit, Porewa, at 39 guineas.

Dominion Pretoria, by Oak de Kol 2nd Homestead Fobes (imp.)—Freda, which gave in 297 days 7,609 lb. of 3·25 milk and 249·28 lb. of butter-fat as a heifer.—F. W. Koberstein, Feilding, at 44 guineas.

Dominion Nowra, by Oak de Kol 2nd Homestead Fobes (imp.)—Pride II of Brundee, which gave in 359 days 13,519 lb. of 3·11 milk and 420·97 lb. of butter-fat. —Abraham and Williams, Levin, at 88 guineas.

Dominion de Wet, by Oak de Kol 2nd Homestead Fobes (imp.)—Lulu, which gave in 151 days 4,038 lb. of 3·5 milk and 141·347 lb. of butter-fat. (Dried off, owing to septic poisoning following milk-fever).—J. H. McNair, Matamata, at 70 guineas.

Dominion Domino Fobes de Kol, by Oak de Kol 2nd Homestead Fobes (imp.) —Domino V, which gave in 290 days 12,873 lb. of 3·11 milk and 400·88 lb. of butter-fat (still milking).—A. E. Judge, Mangaonoho, at 132 guineas.

Dominion Count Manola de Kol, by Oak de Kol 2nd Homestead Fobes (imp.) —Manola, which gave in 359 days 20,717 lb. of 2·82 milk and 584·49 lb. of butter-fat.—W. R. Wright, Rahotu, at 120 guineas.

Dominion Domino Oak de Kol, by Oak de Kol 2nd Homestead Fobes (imp.) —Dominion Pride, which (as a two-year-old) gave in 365 days 10,141 lb. of 3·65 milk and 370·84 lb. of butter-fat.—C. Hopping, Feilding, at 250 guineas.

Dominion Mutual Rock de Kol, by Oak de Kol 2nd Homestead Fobes (imp.) —Mutual Mercedes of Rock (imp.), which, as a heifer, gave in 365 days 11,640 lb. of 3·21 milk and 374·37 lb. of butter-fat.—W. Bevan, Manakau, at 45 guineas.

Dominion Pietertje, by Oak de Kol 2nd Homestead Fobes (imp.)—Spot IV, which gave in 314 days 10,340 lb. of 4·09 milk and 423·11 lb. of butter-fat (and still milking).—A. E. Judge, Mangaonoho, at 256 guineas.

Dominion Oaklands, by Oak de Kol 2nd Homestead Fobes (imp.)—Blanche, which gave in 75 days 1,410·5 lb. of 3·2 milk and 45·136 lb. of butter-fat (a bad calving and was dried off).—H. Hartnell, Woolston, at 40 guineas.

Dominion Emperor de Kol, by Oak de Kol 2nd Homestead Fobes (imp.)—Empress, which gave in 271 days 7,430 lb. of 2·8 milk and 213·09 lb. of butter-fat (and still milking).—P. Nesbit, Rata, at 30 guineas.

Dominon Botha, by Oak de Kol 2nd Homestead Fobes (imp.)—Barbe, which died soon after calving. In the 1911–12 season she gave 10,754 lb. of 3·4 milk and 365·65 butter-fat.—W. Williams, Mataroa, at 82 guineas.

Dominion Dutchland, by Canary Paul Fobes Homestead—Jessie Fobes Beets, which gave in 365 days 14,052 lb. of 3·136 milk and 440·69 lb. of butter-fat.—C. Hopping, Feilding, at 71 guineas.

Dominion Sarcastic de Kol, by Pietje 22nd Woodcrest Lad—Woodcrest de Kol Cornella (imp.), which gave in 224 days 6,898 lb. of 3·39 milk and 233·78 lb. of butter-fat (and still milking).—A. C. Banks, Matamata, at 42 guineas.

Dominion Woodcrest Sarcastic Lad, by Pietje 22nd Woodcrest Lad—Woodcrest Daisy (imp.), which gave in 210 days 5,941 lb. of 3·03 milk and 179·01 lb. of butter-fat (and still milking).—J. C. Patterson, Wanganui, at 46 guineas.

Dominion Cronje, by Oak de Kol 2nd Homestead Fobes (imp.)—Mary's Pietertje, which was dried off in the 1912–13 season on account of bad calving. During the four previous seasons she averaged 12,779 lb. of milk, average test 3·8, and 484·8 lb. of butter-fat.—R. Holland, Brooklyn, Wellington, at 36 guineas.

THE DEPARTMENT'S MILKING SHORTHORNS.

THAT the Australian milking Shorthorns imported by the Department in November, 1911, are of an undoubted milking strain is proved by the fact that the dam, Melba III, of the senior bull, Melba's Prince, has headed the list in the first year of the tests conducted by the New South Wales Department of Agriculture in connection with the United Purebred Cattle Association's register. The nine months' record showed that Melba III gave 13,753 lb. of milk, equal to 582 lb. of butter. She finished the full year's test

with a record of 15,233 lb. of milk, equal to 653·89 lb. of butter. In this official test 319 cows took part, including 59 Shorthorns, 17 Guernseys, 238 Jerseys, and 5 Holsteins. The second-best cow, a Jersey, yielded 6,685 lb. of milk, estimated to contain 481 lb. of butter, in the nine months. Melba's Prince is leaving most promising milking-stock at the Ruakura Farm of Instruction. Melba III and her son, Melba's Prince, are pictured on this page.

Melba III, the Dam of Melba's Prince.

Melba's Prince.

Cast-iron tiles seem to give satisfact on at several Danish creameries for the receiving-platform, where the wear-and-tear on the floor is very great.—*Hansen's Dairy Bulletin.*

THE RUAKURA HERDS.

Following are the records for last season of the Jersey and Shorthorn cows in the herds of the Ruakura Farm of Instruction, with the exception of those which calved late and have not yet finished their season :—

Jerseys over Two Years old.

	Pounds Butter-fat.
Little Fancy	290
Wild Briar	380
Cherry Blossom	290
May Flower	357
May Blossom	295
Ruby's Buttercup	380
Fury's Princess	307
Eureka	378
Glenora	370

Two-year-old Jerseys.

Dominion Hope	253
Dominion Pride	269

Shorthorns over Two Years old.

	Pounds Butter-fat.
Adelaide	415
Generosity	272
Penrose	311
Bean	365
Ada	350
Nora	340

Two-year-old Shorthorns.

Daisy	244
Jean	314
Miss Cox	242

	Pounds Butter-fat.
Average of Jersey cows	338
,, heifers	261
,, cows and heifers	324
Average of Shorthorn cows	342
,, heifers	266
,, cows and heifers	317
Average of twenty cows and heifers	321

Adelaide,

The highest producer in the herds at the Ruakura Farm of Instruction.

AGRICULTURE AND RESEARCH.

Recent developments at the agricultural stations in this country [England], as recently outlined by the President of the Board of Agriculture, cannot fail to have a definite influence on the future of agriculture in this country. It would seem that at last this subject is being tackled in the right spirit, and that the Government, through the Development Commission or otherwise, is giving substantial and increasing financial support to the many institutions which are now conducting agricultural research. The Imperial College is dealing especially with plant physiology, and the important station at Cambridge with plant-breeding and animal nutrition.

One could not fail to be struck, at the recent opening of the extensions at the Rothamsted Station, with the fact that the modern treatment of the subject of agricultural chemistry is slowly but irresistibly modifying the relationship between science and agriculture.

It is interesting to note that the rapid changes which have taken place have compelled the organizers to train a number of chemists in agricultural chemistry, and with this object in view thirty-six scholarships of £150 per year, tenable for three years, have been awarded. The appointment in connection with the agricultural stations of advisers, whose sole function is to transmit direct to the farmers results of research work, is an additional and important link in the new scheme. The Board of Agriculture has actually granted £9,000 a year towards the salaries of these advisers, and £20,000 for agricultural research. This great advance is a matter for congratulation, and is a definite reward for the labours of that small body of scientific men who for many years past attempted to direct the attention of agriculture to the work of chemists. Among these the name of Professor H. E. Armstrong may be mentioned, for his untiring devotion to the work conducted at Rothamsted has perhaps more than anything else played a part in shaping the policy which has led to the recent developments at that station.—"*The Chemical World,*" *London, September, 1913.*

AGRICULTURAL EDUCATION IN BRITAIN.

W. R. L. Williams.

As great interest has lately been evinced by farmers and others in the education of the young farmer, the following extract from a letter received from Professor D. D. Williams, M.R.A.S.E., F.H.A.S., of the University College of Wales, Aberystwyth, may be of interest to readers of the *Journal*:—

"We have short courses for farmers' sons every winter for eight weeks, commencing about the 18th October. About forty farmers' sons attend every year from the counties affiliated to the College. Each gets a County Scholarship of £5 to £8, and takes the following subjects: Agriculture (all branches dealt with broadly), twenty-five lectures; veterinary sciences, eight lectures; chemistry, twenty-five lectures; practical chemistry, twenty-four hours; arithmetic, eight hours; farm excursions, two per week. Fees, £3 10s. per term.

"We recommend about ten of the best in the examination at the end of the course for a continuation course the following term, and the counties give them scholarships of £10 each. The best of these again return the following session as advanced-course students and get scholarships, and again the best of these return for a third session and take the College and other diplomas.

"The system works admirably, and in fact this system is the one which has made our College so popular. I give about eighty lectures every winter to farmers in the affiliated counties, and always get plenty of fellows to apply for short-course scholarships in this way. Of course, we have our University degree course as well."

I might add that this University, beside granting diplomas in the shorter and less technical courses, also grants degrees of B.Sc. in agriculture. The tuition fee for the latter course, which extends for three years after a student has matriculated, is, I believe, £10 per annum. There is a farm of some couple of hundred acres belonging to, and run in conjunction with, the College. I know several farmers' young sons who attended these short courses and were highly pleased with them.

IMPROVEMENT OF LIVE-STOCK.

ACTION BY HOME GOVERNMENT.

THE Board of Agriculture and Fisheries has issued the following scheme for the advancement of the general farm stock of England and Wales:—

The Lords Commissioners of His Majesty's Treasury have agreed, on the recommendation of the Development Commissioners, to make an advance to the Board of Agriculture and Fisheries of £37,000 (exclusive of provision for clerical and accounting work at the offices of the Board), by way of grant from the Development Fund, in aid of the improvement of live-stock in England and Wales for the current financial year.

The main object of the scheme is to afford means of demonstrating to groups of farmers, especially the smaller farmers, that it is sound economy and of pecuniary advantage to use only sound and high-class sires, and to keep records of the milk-yield of their dairy cows with a view to getting rid of poor milkers and improving by judicious selection and breeding the productiveness of their herds. Preference in the assistance contemplated is to be given, as far as possible, to occupiers of agricultural holdings which either do not exceed 100 acres in extent or, if exceeding 100 acres, are of an annual value for purposes of income-tax not exceeding £100.

The assistance will take the form of financial help for the provision of high-class bulls, stallions, and boars, at the same low fees as are usually paid for the use of an inferior type of sire, and the Board are also authorized to pay one-half of the expenses of associations of farmers formed for the purpose of taking and checking the milking-records of the herds of their members, but such grant is not to exceed £50 to each association. Where, however, a society is in a position advantageously to employ more than one tester, the Board will be prepared favourably to consider a relaxation of this limitation.

It is prescribed by the conditions attached by the Development Commissioners to the grant that the provision of stallions and boars, and, wherever possible, the provision of bulls, is to be made through the medium of clubs and societies, which may either be already in existence or be specially formed for the purpose; as the Commissioners consider that the formation of societies will afford the best means of enabling small farmers to realize the advantages of co-operating, and of securing thereby the services of high-class sires, which as isolated individuals they might not be able under existing circumstances to obtain. In regard to bulls, it is recognized that in some districts it may not be possible at once to form clubs and societies for their provision, and where this is found to be the case, grants may be offered to individual breeders who are willing to place approved bulls at the disposal of their neighbours.

It is not intended, however, that the offer of grants to individuals for the provision of bulls shall be continued for so long a period as that of grants to clubs.

The total amount of financial assistance which the Board are authorized to give in one year under the various parts of this live-stock-improvement scheme is as follows :—

	£
(1.) Grants to societies or individuals for the provision of bulls	13,800
(2.) Grants to societies for the provision of boars ..	1,000
(3.) Grants to heavy-horse societies..	8,800
(4.) Grants to milk-recording societies	5,000
(5.) Grants to the selected agricultural institutions for the employment of Live-stock Officers ..	8,400
	£37,000

The Board have divided the grant between England and Wales in proportion to the estimated numbers of holdings above 20 and not exceeding 100 acres—namely, 81 and 19 per cent. to each country respectively; and they have apportioned the amount available for England between the ten provinces in o which the country has been divided, in accordance with the distribution of animals between those districts. A statement giving details of the division is attached, and the Board suggest that the latter principle should be adopted by the Live-stock Committees of the provinces in subdividing the grants among the counties.

Grants for Bulls.

Grants for the provision of bulls will be made on the following conditions :—

(1.) No grant exceeding £12 per annum is to be made to any individual bull-owner, or exceeding £15 per annum to any club or society.

(2.) Not more than four annual grants of £12 are to be made to any individual; and not more than five annual grants of £15 to any society for each approved bull provided by it.

(3.) Grants are only to be made to individuals when the Live-stock Officer in the area concerned is satisfied after full inquiry that it is not possible to form a bull club for a district in which the provision of a good bull is necessary.

(4.) No grant is to be made to any individual in respect of a bull owned by him before this scheme comes into operation unless the Live-stock Officer is satisfied that in return for the grant the bull can and will be made available to an appreciably greater number of cows belonging to small farmers than it now serves.

(5.) Not more than one-third of the sum available for grants in any one year is to be spent in grants to individuals.

No grants to individuals will be made in respect of any year after 1918–19, or in excess of a total sum of £25,000 from the beginning of the scheme; and no grants will be made after the year 1918–19 except to clubs or societies formed since the commencement of the scheme which have not received the full number of grants authorized by the second condition above.

After the year 1918–19 assistance by way of loans, repayable without interest, will be available if the financial position of the Development Fund warrants it.

Grants for Boars.

Grants in aid of the provision of boars will be made to societies only. The amount of the grant will be one of £4 for each approved boar provided, for the first year, and £2 for the second year.

Grants to Heavy-horse Societies.

Grants will be made to heavy-horse stallion societies on the following conditions :—

(1.) No grants shall be given to societies which hire stallions to travel at a fee exceeding £3 3s.

(2.) In no case shall the grant to a society exceed £80 for each approved stallion provided by it, of which not more than £40 may be a direct grant, the remainder being utilized, if necessary, for "assisted nominations."

(3.) Except in the case of "assisted nominations," no reduction in the amount of the service fee usually charged shall be made by the societies receiving grants.

(4.) The stallions hired by societies receiving grants shall be approved by competent experts, and registered under the Board's scheme for the registration of stallions; and the mares for which assisted nominations are given shall be approved by the society as suitable for the purpose.

(5.) The rules of the societies receiving grants shall be approved by the Board.

Grants to Milk-recording Societies.

Grants will be made to milk-recording societies on the following conditions:—

(1.) Preferential consideration shall be given to societies already formed on a co-operative basis.

(2.) The societies receiving grants shall employ "testers" to check or take the milk-records at proper intervals.

(3.) No society shall receive a grant exceeding £50 annually or exceeding one-half the expenditure incurred by it, and no society shall continue to receive a maximum subsidy for more than two years.

The appointment of the testers will have to be considered and receive the approval of the Live-stock Committee of the Advisory Council.

Live-stock Officers.

Grants will be made for the salaries and expenses of a Live-stock Officer to be attached to each of the selected agricultural institutions in the twelve provinces of England and Wales.

This officer will be primarily responsible for the local promotion and administration of the live-stock scheme in the area for which he is appointed. He will also be required to give technical advice and assistance to local agriculturists, and to members of the county staff, on questions relating to live-stock.

Administration.

The advisory work in connection with the scheme will be entrusted to the Advisory Councils that have been set up in the ten provinces into which England has been divided, and to the Welsh Agricultural Council in Wales.

These Advisory Councils are to be composed of nominees (1) of the selected agricultural institutions in the provinces, (2) of the County Education Committee, and (3) of the Board. Each Advisory Council will appoint a Live-stock Committee, who will act as the advisory body in connection with the live-stock scheme, with power to approve schemes prepared by the County Live-stock Committees and to submit such schemes to the Board for approval.

The duties of a Live-stock Committee of an Advisory Council will be (1) to make recommendations to the Board in respect of the allocation of the various grants amongst the counties comprised in the province for which they are appointed; (2) to advise the Board on the conditions to be attached to the grants to be given towards the cost of hiring or purchasing suitable male animals; (3) to advise the Board generally on the operation of the scheme, on the results obtained from it, and on any other questions in connection with the improvement of live-stock on which the Board may deem it advisable to consult them; (4) to appoint such sub-committees as they may consider necessary to assist them in the conduct of their business.

The Live-stock Officer of the province will act as secretary to the Live-stock Committee of the Advisory Council.

The administrative body will be a County Live-stock Committee in each county, and it will be constituted as follows:—

(1.) The county members of the Live-stock Committee of the province, one of whom shall act as chairman.

(2.) Two members, either of the County Agricultural Education Committee or sub-committee of the County Council, to be nominated by the County Council.

(3.) Not less than two practical stock-breeders to be appointed by the above members of this committee, and at least one member of any recognized county breed society within the province (if the society is not already represented on the County Live-stock Committee), such member to be nominated by the breed society concerned.

(4.) The Live-stock Officer of the province, with the consent of the County Council, the Agricultural Organizer of the County, and the County Land Agent will be present at the meetings.

The County Live-stock Committee may appoint such sub-committees as they think fit, and the County Councils will be invited by the Board to provide clerical assistance and a room for meetings.

The general procedure under the scheme will be as follows :—

(1.) The Board will inform the Live-stock Committee of the Advisory Council of each province of the amount of the grant allocated to the province.

(2.) The Live-stock Committee of the Advisory Council will decide the amount to be allocated to each county, and will inform the County Live-stock Committee.

(3.) The County Live-stock Committee will prepare a scheme for dealing with the grants allotted to their county, and will submit it to the Board for approval through the Live-stock Committee of the Advisory Council of the province.

(4.) The animals will be selected and approved by a selection committee or committees appointed by the County Live-stock Committee. The Live-stock Officer of the province shall be a member of each selection committee, and the County Live-stock Committee may appoint on the selection committee or committees such properly qualified persons as they may think fit.

(5.) Applications for grants are to be made to the Live-stock Officer of the province.

(6.) The Board will make the grants recommended by the County Live-stock Committee direct to the society or individual concerned, and they reserve the right to approve any animal before it is accepted as being suitable for the purpose of the scheme.

The Board will issue in due course rules and regulations to give effect to the scheme, and the Development Commissioners desire that it should be clearly understood that the scheme, in so far as it provides temporarily for grants, whether to individuals or to societies, makes such provision for the purpose of giving a practical demonstration to convince farmers, and particularly small holders, that it is sound economy to pay for the use of a good sire, and that the scheme will be converted at the end of 1918–19 into a system of loans to societies, unless it then appears that that purpose has not been attained.

The Development Commissioners also wish it to be understood that all grants or loans for future years are subject to the general conditions (*a*) that the working of the scheme is satisfactory, (*b*) that in the opinion of the Commissioners the financial position of the Development Fund warrants the expenditure.

TRADE BETWEEN NEW ZEALAND AND VICTORIA.

The imports into Victoria from New Zealand for the quarter ended 30th September, 1913, amounted to £222,506, the principal items being: Horses, stallions £5,897, mares £165, geldings £484; bullion (gold), £79,098; coal, £1,044; hemp, £20,946; fish, all kinds, £4,706; jewellery £2,470; machinery, all kinds, £1,225; oakum and tow, £1,051; pumice-stone, £2,528; hides (cattle), £32,696; timber, £53,102; wool £4,705.

The exports from Victoria to New Zealand for the same period amounted to £374,595, the principal lines being: Books (printed), £9,083; fruits, dried £2,549, fresh £3,724; flour, 2,672; rice, cleaned £4,463; leather, £3,214; machinery, all kinds, £4,348; manures, £23,099; oils, all kinds, £2,724; onions, £2,182; plants, trees, and bulbs, £2,030; rubber manufactures n.e.i., £14,531; hides (cattle), £2,338; specie, gold, £200,000; manufactured stationery, £3,345; sugar (cane), £12,262; tea, £6,876; tin ingots, £3,289; tobacco, manufactured, £19,077; wines (all kinds), £2,927.

COLOURING OF MARGARINE.

DEPUTATION TO THE PRESIDENT OF THE BOARD OF AGRICULTURE.

THE following report, dated London, 29th August, has been received by the Prime Minister from the High Commissioner:—

The very great increase that is going on in the consumption of margarine is viewed with considerable uneasiness by those engaged in the butter trade. The manufacture of margarine by the use of highly scientific methods, which includes the use of colouring-matter, enables the manufacturer to place before the consuming public an article of food that is a very close imitation of pure butter, which is of a food value of 104 to 100 of butter. The growth of the margarine business is very rapid: statistics for the seven months, January to July, inclusive, in 1912 and 1913, show that during the 1912 period 773,609 cwt. was imported into the United Kingdom, and in 1913 the figures had risen to 858,127 cwt., being an increase of 84,518 cwt. for that period. It is impossible to obtain accurate information regarding the quantity of margarine manufactured in the United Kingdom, but the estimate is given as being 50,000 cwt. per week; this quantity added to an approximate weekly import of 20,000 cwt. brings the total consumption up to, say, 70,000 cwt. per week.

The menace to the butter trade is due to the fact that the law permits colouring-matter to be used in the manufacture of margarine, and so accurately is this carried out that the appearance is exactly similar to the natural colour of butter. The similarity of margarine to butter is now so great that constant precautions are taking place owing to dealers selling margarine as butter to their customers.

The object of the deputation was to place before Mr. Runciman, President of the Board of Agriculture, the urgent necessity for some steps being taken to prevent the use of colouring-matter in the manufacture of margarine. The following is a report of the business of the deputation, with the names of those that attended:—

The following firms attended the deputation which waited on the Minister of Agriculture: Messrs. W. G. Lovell, of Lovell and Christmas (Limited); A. S. Page, of Samuel Page and Son; A. J. Mills, of Mills and Sparrow; F. Goodman, of A. Clement and Sons (Limited); Mr. Bolton, of R. and W. Davidson (Limited); W. Foley, of Foley Bros.; R. E. Hellaby and Mr. Davidson, of Dalgety and Co.; W. A. Robinson, of the Anglo-Continental Produce Company; S. P. Page president of the British Dairy-farmers' Association; together with the High Commissioners for the Commonwealth and New Zealand; J. Cameron and J. R. King, representing the Australian Co-operative Produce Committee. We very much regret to say that the Butter-sellers' Association was not present at the deputation.

SIR GEORGE REID briefly introduced the deputation, pointing out that in the interests of dairying it was necessary not only throughout Great Britain, but in the Dominions beyond the seas, that something should be done to control the ever-increasing sale of margarine.

MR. J. R. KING, representing the Colonial Committee, then said, "It is nothing but absolute necessity which has brought this deputation to you to-day. As representatives of the dairying industry of the United Kingdom, Australia, and New Zealand, we ask your, and your Government's, assistance in passing a measure through the House of Commons taking away the legality of colouring in margarine. Our reasons are that the future of the industry is jeopardized not only for butter, but for many of the subsidiary foodstuffs that emanate from dairying. Take, for instance, the present great shortage in bacon-supplies. This

is seriously curtailed by any diminution in dairying. We ask nothing vindictive, knowing full well that margarine is a valuable food-supply in itself, nor do we ask that the food-supply of the poor should be interfered with, but believing as we do that if the colour is taken out of margarine the poor will get a much cheaper food than they are getting to-day, if they still wish to use the article, and the dairying industry would have no right to complain of any unfair competition. Of course, you may say that there are several Acts and regulations dealing with this matter, but we want to point out that the law as at present carried out is little more than a farce. Some of the members of this deputation can tell you that after inspectors have gone home tons of margarine are sold as butter, to say nothing of the cheap restaurants, boardinghouses, and homes were margarine is legally purchased over the counter, but immediately it crossed the threshold of any of these places becomes butter, simply because it is legally allowed to colour this substitute so that even an expert might easily be deceived.

"The enormous growth in the sales of this substitute is apparent to every one. Not many years ago a grocer was ashamed to let it be known that he sold margarine; now conditions are changed. To-day the window is filled with it; it is made a draw for other goods. It is advertised at butter prices with an equal quantity given away with that purchased. In other stores for every 1 lb. purchased they practically make you a present of 1½ lb. of sugar. Can you wonder at the grocer who has a small business passing off the substitute for the real article? The imports into Great Britain during 1912 were over 1,000 tons per week, to say nothing of that locally manufactured. It is estimated by one of the manufacturers that the present supply of margarine manufactured in this country is about 50,000 cwt. a week the year round, and the chairman of one of the largest concerns interested, at their last annual meeting, stated that the quality of the article they were turning out was such that it needed no disguising to make it palatable to the consumers. If that be so, then why make it in the natural colour of butter? In most countries steps have been taken to control this trade. In America special taxes have to be paid by manufacturers. There is also a heavy import duty, and even to sell margarine in its natural colour vendors have to pay ¼ cent per pound. In Canada manufacture and sale of margarine is absolutely prohibited. In New Zealand artificial colouring is prohibited, also in all the States in the Commonwealth except South Australia. France and many other countries also control the trade; but here manufacturers have a free hand provided they do not infringe the present Act. We have nothing to say against the inspectors, who no doubt carry out their duty, but there are times when the inspector ceases work, and this is when the dishonest trader makes his harvest.

"Since your Government has been in power we know that you have done all you possibly can for the man on the land. Your village settlements and assistance, and advice given to the co-operative credit societies, are all steps in the right direction to maintain and keep the man on the land, who is looked upon as the backbone of the country, more especially in those dominions beyond the sea which require further developments to maintain the food-supply for the Mother-country. I would like to point out that it is of little value placing the man on the land to develop it unless he has a market for his produce, and under the present conditions of allowing a manufactured article to be coloured in imitation of butter you are cutting the market from under his feet, thereby curtailing not only the butter-supplies but many other valuable food products."

Mr. A. J. Mills, representing the Colonial Butter-selling Agents, handed to Mr. Runciman copies of advertisements taken from the current trade papers, showing that margarine was described as being something as good as butter or like butter, and in many other terms showed that they were trading on the colourable imitation of butter, and asked the Minister for Agriculture, in the interests of the industry, although he knew there were difficulties in the way, to do all he possibly could to assist in suppressing the colouring of margarine.

Mr. S. P. Page, president of the British Dairy-farmers' Association, said that besides being a member of the Butter-selling Agents he also represented that large body the British Dairy-farmers' Association, and trusted that the Minister would consider the case that the deputation paced before him in the interests of the dairying industry. He did not wish to frighten the Minister, but the question would very soon become not only a British question, but also an Irish one. He had recently been in Ireland, and development that was taking place there in

dairying was such that before long the Irish dairy-farmer would be up in arms against the unfair competition caused by the colouring in margarine.

The Hon. Mr. Mackenzie also thanked Mr. Runciman for receiving the deputation, and stated that he was more a listener than a speaker, but trusted that the Minister for Agriculture would take note of the case that had been placed before him. There was no doubt that the increasing consumption of margarine was growing enormously, and it was undoubtedly being supplied to consumers as pure butter. Something would have to be done to protect the consumers from being defrauded, otherwise the secondary-quality butters on this market would become displaced. So far as New Zealand was concerned, by the continual supply of high-grade butter we were safe.

Mr. W. A. Robinson bore out all that was said by the former speakers.

Mr. Runciman received the deputation in a very kindly manner, and said he was very much impressed with the case that was placed before him. He said that his whole interests were wrapped up in agriculture, and if anything could be done it would be done, but he saw great difficulties in the way. Some of the legislation of the past years had exactly the opposite effect from that which was intended, and before anything was done great consideration would be necessary. He said he was much impressed with the advertisements placed before him by a member of the deputation from trade papers, and he could see that the manufacturers and sellers of margarine were sailing very close to the wind, and he would confer with the Board of Trade and, when steps were decided on, would acquaint the High Commissioners for the Commonwealth and New Zealand with what was being done. It was evident to all that a large and most obvious fraud was being carried on at the expense of the consuming public.

Mr. Runciman asked Mr. S. P. Page, president of the British Dairy-farmers' Association, if he thought the great bulk of the producers throughout the United Kingdom would favour the abolition of colouring in butter.

Mr. Page replied that he was quite sure that the abolition of colouring both in butter and milk would be welcomed by the whole of the industry throughout England.

The total number of cattle in Ireland returned in June of this year is the largest on record—4,932,625 head, as compared with 4,848,498 in 1912, an increase of 84,127. Sheep show a decrease of 208,105 as compared with 1912. The number returned this year amounts to 3,620,724, as compared with 3,828,829 in 1912. The total number of pigs has decreased by 263,597.

Weraroa Holsteins.—Manola, whose bull calf realized 120 guineas at the recent sale of the Weraroa Holstein calves, has shown an excellent return for capital invested. She was purchased from Mr. J. C. N. Grigg, of Longbeach, on the 6th August, 1909, for £12. Since then the sales of her progeny have realized £546 13s., and she has produced since becoming the property of the Department 67,640 lb. of milk and 2,134·25 lb. of butter-fat, an average per year of 16,910 lb. of milk and 533·56 lb. of butter-fat.

The introduction and application of the grading and premium principle in the creamery business has gradually and generally improved the quality of the cream supplied to the creameries. It has materially raised the general standard of quality of the creamery-butter production, and enabled the best creameries to secure a premium in the form of a higher average price for their butter. As the means to an end it has become fully justified.—*Annual Report of the Ontario Department of Agriculture.*

THE WORLD'S BEEF-SUPPLY.

THE Veterinary Officer of the New Zealand Government in London, Mr. A. Crabb, F.R.C.V.S., has furnished the following report on the shortage in the world's supply of beef:—

I attach hereto a table showing the total number of cattle in the more important countries of the world at various periods, with their relation to the populations, and also, where possible, the percentages of dairy and other cattle. It is, unfortunately, impossible to summarize the figures, for the reason that the census is taken in various countries at different times, and also that no figures are available differentiating dairy from beef cattle in numerous cases. I think, however, that study of the table will prove two points, viz.: (1) That, as indicated in my report on the shortage of hides, dated 24th January last, the cattle of the world are not increasing at the same rate as are the respective populations; and (2) that in several of the more important countries the dairy cattle represent greater percentages of the total herds.

In the following countries the numbers of cattle have decreased: United Kingdom, India, Holland, Norway, Bulgaria, Egypt, Austria-Hungary, United States, Argentina, Japan, Servia, Chile, and Natal.

The following are some of the most notable reductions: In the United Kingdom in 1880 there were 294 cattle per 1,000 of the population; in 1911 this number had fallen to 261. In the Argentine Republic in 1895 there were 5,487 cattle for every 1,000 inhabitants, and in 1908 only 4,656. In the United States in 1880 the cattle numbered 791 per 1,000 people, and in 1912 only 618. In Austria-Hungary in 1880 there were 368 cattle per 1,000, and in 1910 only 319.

On the other hand, the cattle in Australia, New Zealand, Denmark, Sweden, Italy, Germany, Canada, Russia, France, Ceylon, and Transvaal have increased more rapidly than the populations, the following being the principal examples: In Germany in 1883 there were 329 cattle per 1,000 inhabitants, and in 1907 this had risen to 331. In Italy in 1882 there were 167 per 1,000, and in 1908 this had increased to 183. In France in 1885 there were 347 cattle per 1,000, and in 1911 this had risen to 367. In Australia in 1901 there were 2,279 cattle per 1,000, and in 1910 there were 2,654.

These increases, however, by no means compensate for the decreases which have taken place in other countries, as the sum of the figures upon which calculations have been based, in the case of those countries where decreases are noted, is approximately 210,389,000 whereas in those countries where increases have occurred the figures total only 102,654,000. This can hardly be taken as a true statistical comparison, on account of the figures covering a range of some few years in each case, but they will, I think, give a fairly accurate indication of the position.

It will further be noted that in several important instances the percentage of dairy cattle has increased during the period reviewed. This is the case in United Kingdom, Finland, United States, Japan, Sweden, Australia, New Zealand, France, and Servia.

The most striking examples of such increases are: In the United States in 1880 the dairy cattle represented 31 per cent. of the total, and in 1912 they were 36 per cent. When it is noted that there are close upon 60,000,000 cattle in that country, it can be understood that a 5-per-cent. increase in the dairy cattle would lead to a considerable reduction in the available number of beef cattle. In France in 1885, 49 per cent. of the cattle were used for dairying, and in 1911 the percentage had risen to 52. In Australia in 1901 there were 16 per cent. of dairy cattle, and in 1910 there were 18 per cent. In New Zealand in 1900 the dairy cattle represented 33 per cent., and in 1911 the proportion had risen to 40 per cent.

As to the future, there is reason to anticipate that any shortage now being experienced will become accentuated, as a study of the figures for some of the more important countries shows that the human populations are increasing at a greater rate than the cattle.

TABLE SHOWING THE TOTAL NUMBER OF CATTLE IN THE MORE IMPORTANT COUNTRIES OF THE WORLD AT VARIOUS PERIODS.

Country.	Year.	Dairy Cattle.	Other Cattle.	Percentages of Totals.		Totals.	Cattle per 1,000 Population.			Population.
				Dairy.	Other.		Dairy.	Other.	Total.	
United Kingdom ..	1880	3,639,755	6,193,808	37	63	9,833,563	109	185	294	33,500,000
	1911	4,390,467	7,435,517	38	62	11,825,984	99	162	261	45,360,000
India	1898	..	..	..	..	87,000,000	..	..	381	228,500,000
	1903	..	..	..	..	85,100,000	..	..	367	231,800,000
Australia	1901	1,327,418	7,164,010	16	84	8,491,428	365	1,914	2,279	3,725,500
	1910	2,064,599	9,680,115	18	82	11,744,714	478	2,176	2,654	4,425,083
Canada	1891	1,857,112	2,263,474	43	57	4,120,586	354	470	824	5,000,000
	1911	2,867,600	4,210,000	41	59	7,086,600	403	581	984	7,205,000
New Zealand ..	1900	406,606	850,074	33	67	1,256,680	540	1,096	1,636	768,278
	1911	804,078	1,216,093	40	60	2,020,171	802	1,202	2,004	1,008,000
Argentina	1895	1,800,799	19,900,727	9	91	21,701,526	494	4,993	5,487	3,954,911
	1908	2,163,900	26,952,725	7	93	29,116,625	326	4,330	4,656	6,489,023
Russia	1888	..	..	..	..	27,600,000	..	..	269	102,000,000
	1904	..	..	..	..	33,200,000	..	..	286	116,000,000
Finland	1890	928,276	376,911	71	29	1,305,187				
	1907	1,113,633	377,631	75	25	1,491,264				
United States ..	1880	12,443,120	27,232,413	31	69	39,675,533	245	546	791	50,155,283
	1912	20,699,000	37,260,000	36	64	57,959,000	222	396	618	93,793,000
Belgium	1880	796,178	586,637	58	42	1,382,815	145	105	250	5,519,844
	1909	920,534	945,299	49	51	1,865,833	123	127	250	7,451,903
Denmark	1881	898,790	571,288	61	39	1,470,078	452	287	739	1,988,300
	1909	1,281,974	972,008	57	43	2,253,982	514	387	901	2,500,000
France	1885	6,414,487	6,690,483	49	51	13,104,970	170	177	347	37,755,000
	1911	7,606,670	6,945,760	52	48	14,552,430	191	176	367	39,602,000

Holland	1880	908,000	561,600	62	38	1,469,600	228	138	366	4,012,693
	1910	1,068,361	958,582	53	47	2,026,943	181	160	341	5,945,000
Japan	1899	769,163	483,702	62	38	1,252,865	19	11	30	42,270,628
	1910	910,702	473,481	66	34	1,384,183	18	9	27	50,939,000
Norway	1890	706,925	299,574	70	30	1,006,499	354	152	506	1,990,000
	1907	727,898	366,203	67	33	1,094,101	315	155	470	2,330,264
Servia	1890	235,135	584,116	29	71	819,251	113	278	391	2,096,043
	1900	307,764	648,897	32	68	956,661	123	260	383	2,500,000
Sweden	1880	1,409,236	818,521	63	37	2,227,757	307	180	487	4,573,101
	1910	1,861,219	886,307	68	32	2,747,526	338	159	497	5,522,000
Switzerland ..	1886	663,102	549,436	55	45	1,212,538	229	187	416	2,916,750
	1911	796,533	646,838	55	45	1,443,371	229	187	416	3,470,000
Bulgaria	1892	..	..	..	..	1,425,781	..	..	452	3,154,375
	1905	..	..	..	..	1,695,533	..	..	420	4,035,623
Ceylon	1905	..	..	..	..	972,796	..	..	244	3,950,123
	1911	..	..	..	..	1,022,346	..	..	249	4,109,000
Chile	1907	..	..	..	..	2,303,659	..	..	688	3,349,279
	1911	..	..	..	..	1,640,322	..	..	489	3,353,000
Egypt	1907	..	..	..	..	778,896	..	..	69	11,287,359
	1910	..	..	..	..	672,091	..	..	57	11,800,000
Italy	1882	..	..	..	..	4,772,162	..	..	167	28,600,000
	1908	..	..	..	..	6,198,861	..	..	183	33,910,000
Natal	1901	..	..	..	..	454,943	..	..	492	925,118
	1909	..	..	..	..	502,212	..	..	416	1,206,386
Transvaal	1909	..	..	..	..	899,673	..	..	708	1,269,951
	1911	..	..	..	..	1,196,069	..	..	713	1,677,000
Germany	1883	9,087,293	6,699,471	58	42	15,786,764	191	138	329	49,438,434
	1907	10,966,998	9,663,546	53	47	20,630,544	175	156	331	62,346,136
Austria-Hungary ..	1880	..	..	..	..	13,895,455	..	..	368	37,741,434
	1910	..	..	..	..	16,395,337	..	..	319	51,340,603

THE HEMP INDUSTRY.

W. H. Ferris.

On the whole the quality of the hemp which came forward for shipment last month was satisfactory. Of that graded at Wellington (from the Hawke's Bay, Manawatu, Wairarapa, Blenheim, and Westland districts) about 60 per cent. reached a "good-fair" standard. The prevailing weakness in the unsatisfactory lines was bad and uneven stripping—the body of the hank being bruised and the tail "jumped." This excessive beating of the thicker portion of the leaf and the failure to strip the thinner part properly means that when an endeavour is made to improve the tails by scutching little good can be done owing to the amount of vegetable matter in the tail and the weakness of the body. The more the attempt to rectify the trouble by scutching is persisted in the worse becomes the condition of the tail of the hank, which develops into a more or less tangled mass. The "jumped" or "slipped" tail is not to be confused with the partially stripped tip, which can easily be beaten off in the scutcher, and a good end to the hank thereby secured. Obviously the cause of the bruised body and the "jumped" tail is that the stripper is not set right, the stripper being too close to the beating-bar for the body of the leaves and not having sufficient give to enable the tips to be stripped. It should be pointed out that such hemp is most condemnable from the manufacturers' point of view, as the weak bruised body will not stand the strain of the tail being specially treated. On the other hand, a fibre dressed coarse even with a "flaxy" tail can be converted by the manufacturer into a useful fibre. It is impossible to put the bruised body and "jumped tail" class of fibre into anything above a "fair" grade.

Unfortunately, a good proportion of the leaf being milled in the Foxton district is diseased, and is therefore incapable of reaching anything higher than a "fair" grade. The disease trouble is confined apparently to this district.

Auckland and Southland hemp has shown little improvement, poor stripping being much in evidence. Even where good leaf is available unsatisfactory fibre is being too often turned out.

The quality of Westland, Marlborough, and Canterbury hemp is still being maintained at an excellent standard, the work of milling hands being very satisfactory in these districts. They are making the most of a good leaf, a condition of things satisfactory to all concerned.

Much of the tow reaching the grading-stores is generally of a poor standard. Indeed, only a very small percentage is being treated as it should be. A consequent result is that many lines have had to be condemned for export. It should be well enough known that dust and rubbish are not tow.

Stripper-slips are practically being neglected. Very few lines are coming to hand, and these are hardly worth the trouble of preparation and shipping.

A Manawatu miller, Mr. G. Craw, has designed a teazing-machine for the treatment of stripper-slips. A line of seven experimental bales forwarded to the Wellington grading-stores last month was classified as second-grade tow. It was a nice, free, and particularly clean line, although it was not of a very good colour. Under this system the by-products of phormium-hemp mills could be converted into valuable commercial commodities.

Excellent competitions took place at the recent show of the Manawatu Agricultural and Pastoral Association. There was a class for stripped, washed, and bleached, but unscutched, hemp, in order to demonstrate the style of stripping necessary to secure the most desirable fibre, and a class for the best bale of hemp. The competition in the former class was excellent. No less than twenty-two entries were received, but, owing principally to unfavourable weather, only ten exhibits were staged. Every bale displayed was of excellent quality. Being unscutched, points could only be given for stripping, colour, and strength, and these features were so good that the majority would have scutched into a fine grade. The winning line, George Seifert's (A. Stewart, stripper-keeper), had an excellent tail, showing particularly fine work in stripping. Given the good scutching possible with such a well-stripped line, it would easily be worth a superior grade. Maddern Bros., of Canterbury, who came second in the above class, won the competition for the best bale. Every feature of the work was so good that the South Island exhibit scored 99 points out of a possible 100. The A. and L. Seifert Company was second with two points less, and G. Craw third with 93 points.

More than 150,000 tons of twine are required annually to bind the grain crops of the world.

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THE APIARY.

F. A. Jacobsen.

Thanks to the recent rains that have been general throughout the Dominion, the outlook for a good honey crop this season is particularly bright. The clover-plants look particularly fresh and healthy, and already a good proportion of them are blossoming freely. Should an occasional shower of rain succeed hot weather the conditions for various plants to yield the golden nectar will be ideal.

A Nucleus Hive.

Nucleus hives are used in the spring for the purpose of mating virgin queens and disposing of queen-cells. As the name indicates, it is a small hive which contains from two to four frames, but the most popular one contains three. A convenient way of making these small hives is to divide a super into three equal parts, with wooden partitions $\frac{1}{8}$ in. in thickness. Should a ten-framed super be divided like this, each compartment would easily hold three frames, while the narrow division-board between each small colony enables the heat to penetrate from one division to the other. Each division or compartment must have its own entrance, and these entrances are made by boring a hole near the bottom of the super on each side and at one end. Nucleus hives are sometimes made independently of one another, and have just sufficient room to contain the usual three frames. Some beekeepers prefer these individual hives, but in many ways they are not so convenient as the three in one.

Forming Nucleus Colonies.

The object of having nucleus colonies having been previously stated, a description of how to form them may prove useful. A strong colony is the best to select, as more small colonies can be formed from a strong hive than from a weak one. Proceed, then, to a strong hive and puff a little smoke in at the entrance to quiet the bees. Remove the cover and lift out the frames with adhering bees, placing one comb containing brood, one containing pollen and honey, and the third an empty comb, in each nucleus. A strong colony should make five or six nuclei. Next close the entrances of these small colonies, and remove them to a cool place to remain until the next day, when they can be set out in the position required. Always leave one nucleus on the old stand to catch

flying bees, and do not close this one up. For this purpose the old hive could be used, but the inside space should be contracted by division-boards.

Inserting Queen-cells.

A queen hatches from her cell in about fifteen days and a half from the time the egg is laid; therefore the best time to make nuclei is when the cells are about twelve or thirteen days old. Immediately after the formation of the small colony insert a queen-cell, which must be confined in a West cell-protector and placed on the centre comb; then close the hive.

The Wedding Flight.

If the larva in the queen-cell is thirteen days old when inserted in the nucleus, the virgin queen should hatch in from two to three days. Five or six days later, weather permitting, she will take her mating flight and return to the hive fertilized. Four days after this meeting with the drone she will commence to lay, and may then be used for requeening full stocks, &c.

Disposal of Nuclei.

After the nuclei have served their purpose they should be united to make fairly strong colonies. Failing this they may be united with any very weak stocks in the apiary. Those containing queens that have not been used may be wintered over to the following spring and then united with any queenless colonies.

Swarm-control.

Every effort should be made to keep down swarming in the manner indicated in previous issues of the *Journal*. It is only strong powerful colonies which gather a valuable surplus of honey.

DISEASED COLONIES.

E. A. Earp.

The problem of how to save healthy brood when treating colonies slightly infected with disease is one which often causes the bee-keeper much hard thinking before he decides to treat the bees. This delay in treatment always results in greater loss in the long-run, to say nothing of the probability of further infection in the apiary.

To obviate all this trouble the beekeeper can treat the colonies by means of bee-escapes. The method of treatment with escapes

is not new, and, although not as yet widely practised, is as safe in the hands of the amateur as in the hands of the expert. To carry out the treatment it is necessary to prepare a clean hive, which is placed on the old stand. In this hive a frame of brood and bees from a healthy colony is placed with the queen from the colony being treated. The rest of the space is filled with sheets of foundation.

The old hive is set at the side of the clean hive so that its entrance faces the side of the latter, and the corner of its alighting-board touches the corner of the clean hive's alighting-board at right angles. A hole is bored in the front of the old hive, and a bee-escape, consisting of a tapering tin tube, is inserted in the hole. The usual entrance is closed, and the bees have therefore no means of egress except through the bee-escape. The tube should be about 6 in. long and perforated to the extent of 2 in. where it is joined to the hive. Its end should be as near the entrance of the clean hive as possible.

The field bees will, of course, return to the old stand and enter the clean hive, and the hatching-bees as fast as they come out of the parent hive will go into the new hive. In about three or four weeks the old hive is relieved of bees and brood, leaving nothing but comb and honey to be melted up.

Slightly infected colonies may be treated at the time a swarm is cast. In this case the parent hive should be removed as described in the foregoing paragraph—set to one side—and the swarm hived on full sheets of foundation on the old stand. After this all queen-cells must be removed from the hive which cast the swarm, the entrance being closed and the bee-escape applied as before. It is imperative that the infected colony hived on foundation (or starters) on the old stand be not disturbed under five days, for when the bees start to the fields after hiving, the wax-workers will take all the infected honey brought from the old hive, and, if left absolutely alone, will digest it in forming wax. If, however, they are disturbed before five days so as to exchange honey they will, before again going to the fields, place the honey, now probably infected, in the first cell the bees have drawn, instead of giving it to the wax-workers, when it will be fed to the first brood that hatches, thus at once reaffecting the colony. When the cluster in the clean hive is disturbed all the comb must be removed and fresh sheets of foundation given. Care must be taken to shade the hive should the weather be hot at the time of breaking. The principle of the above treatment was given by Mr. Baldridge, of Illinois, in 1894, and it has the endorsement of the United States Bureau of Entomology.

ORCHARD WORK FOR DECEMBER.

W. A. Boucher.

Cultivation.

In most localities cultivation of the soil either in orchard or garden should be regarded as an important feature of the season's work, and should be continued persistently throughout the summer months. An orchard or garden with soil well worked and free from weeds and grass, with trees looking clean and healthy and carrying abundant crops of well-developed fruit, is most attractive. On the other hand, a neglected orchard or garden with the land overrun with weeds and grass, with the trees stunted and unhealthy, is not by any means a welcome sight. All growers are urged to keep the soil in such a condition as will lead not only to increased profit but also to its attractive appearance.

Codlin-moth and Leaf-roller Caterpillar.

These orchard pests become increasingly troublesome during the month of December, as in most localities throughout the Dominion warmer weather is setting in. It has come under notice that some growers are under the impression that spraying for codlin-moth need not be commenced before January. This is quite a mistake, for, as has been mentioned in former issues of the *Journal*, the results of the first flight of the codlin-moth can be observed in November, as the eggs—not in great numbers, it is true—can be seen on leaves and twigs adjacent to the clusters of newly set fruit. During the month of December the eggs are laid in numbers that steadily increase as the weather becomes warmer. The period of incubation varies from seven to ten days according to climatic conditions, so that it will readily be seen that to defer spraying until January will probably mean the loss of a fair percentage at least of the season's crop, as well as increasing the difficulty in controlling the heavy flights that must be expected in January and February. Therefore growers are advised not to neglect the December spraying with arsenate of lead.

Bronze Beetle.

In some districts during the early part of the season when the beetles are on the wing, which, fortunately, is only for a compara-

tively brief period, considerable injury to fruit crops may be caused unless precautionary measures are taken to prevent it. Apparently the application of arsenical poisons alone is not sufficient when the beetles are numerous to prevent a fair percentage of the fruit from being blemished, at least, by the attack of the pest. It might be expected that the spraying with arsenate of lead, which proves so effective for the control of codlin-moth, would prove equally effective for the destruction of the beetles, but in many instances this has not proved to be the case. However, if a small quantity of resin solution be added to the arsenate-of-lead spray, but little injury will be caused by the beetle.

Apple and Pear Scab.

It is probable that in many localities apple and pear scab will be more or less troublesome during the month of December. This, however, depends upon the climatic conditions, showery or wet weather with a humid atmosphere being favourable to continued attack by, and spread of, this fungus, while warm weather combined with a dry atmosphere are conditions which in themselves suffice to check severely, if not entirely prevent, further ravages by these diseases. As to whether or not it is necessary to again spray during the month of December for the control of apple and pear scab, growers must use their own judgment. It is recognized that, on account of possible russetting, it is not desirable to apply the Bordeaux mixture more often than is necessary, especially in the case of some tender-skinned varieties of apples and pears.

Peach Aphis.

In some districts this pest is hardly to be observed, while in others it is one of the prominent pests at this season of the year. Either whale-oil soap or McDougall's insecticide will be found to be effective remedies for the control of this troublesome insect. The formula for preparing whale-oil soap is: Warm 14 lb. of whale-oil; in another vessel dissolve 2 lb. of caustic soda; let this cool until just warm, and then slowly add the warm oil, stirring well. When cold this will set into a hard soap. Boil together for about half an hour 5 lb. of whale-oil soap, 7 oz. of sulphur, and 5 oz. of caustic soda in 3 gallons of water. Make up to 40 gallons. If possible, select a dull day for spraying, or spray in the evening.

Leech.

This pest, which will become very numerous and injurious to such classes of fruits as pears, plums, cherries, quinces, should

receive careful attention to keep it well in check. For control on pears and quinces most growers prefer to use arsenate of lead, but in the case of cherries and plums some growers spray with hellebore powder. This latter treatment is essential with some varieties of plums the foliage of which is too tender for the application of arsenate of lead.

Apricot-disease.

Several complaints have recently been received with regard to disease in apricots, which, as far as I can learn, is identical with that described in the following extract from the November, 1911, issue of the *Journal* :—

"An obscure disease, that has so far baffled investigation as to its origin and cause, appeared some time ago in the apricot-trees at the Waerenga Farm. I have noticed trees affected in a similar manner in fruitgrowing districts throughout the Dominion. The first indication of attack by this disease is an unhealthy appearance of the bark at the branch crown—that is, the point where the main limbs branch out from the stem. Cracking of the bark follows, together with distortion of the wood on the limbs above and the stem below the crown. Later the disease travels up the main limbs, attacking by degrees the growth of each successive season. In one large apricot-orchard a considerable number of young trees died as the result of attack by this disease. Apparently caused by fungus, the usual methods of control were adopted, spraying especially with the winter formula of the Bordeaux mixture being carefully and thoroughly carried out. The result was quite unsatisfactory, for the disease remained unchecked. Experiments in soil-treatment were then attempted with the object of endeavouring to control the trouble through the action of the sap. The trees being fairly large, a soil-dressing of 3 lb. of common salt and 10 lb. of lime was given to each, the method of application being to spread over the surface away from the trunk, and above the feeding-roots, and lightly work in with spade or fork. The result appears to have been entirely satisfactory, for a number of trees so treated seem to have thrown off the disease and recovered their vigour. It is important to note that this and other soil-dressings, such as for the control of silver-blight, &c., should be made in early spring, just before or about the time that the buds begin to swell, so that the spring rainfall may incorporate the dressing, or a portion of it, with the soil about the feeding-roots. If applied later and dry weather sets in, the dressing remains inert throughout the season."

GRAPE - CULTURE.

S. F. Anderson.

Vinehouse Work for December.

Where the rods of vines have been carefully grown from well-selected buds, trained up the wires nice and straight, and the growth they have made has been strong, the distance between the nodes and internodes should be from 7 in. to 9 in. When this is the case these rods or stems are permanent. It is not often that these require to be replaced. Accidents, however, are liable to occur, and the node or eye from whence the fruit spur or shoot grows having been injured, pruned too close, or the growing shoot having been broken out, a blank space on the rod is produced. If too many of such blanks occur it then becomes necessary to replace that rod with a new one. It may happen that a grower in his desire to get a return from his vines allows an unsuitable rod to grow and fruit, which from its crooked and short-jointed nature is not fitted to be retained permanently. As the vine gains strength all such imperfect rods should be replaced by better ones.

There need be no sacrifice of fruit in replacing an old rod. A new rod can be trained up parallel with, close to, and between the old rod and the glass, keeping it perfectly straight and preventing any attempt to produce strong laterals by pinching out any such growth. Care must be taken when pinching and stopping other parts not to stop the terminal point of the new rod. This must have perfect liberty until the finish of the growing season, although it may grow right over the ridge of the house. If, however, the laterals are kept back not much inconvenience will be experienced from this.

In some houses where the foliage is very heavy, or in others where the vine-shoots are produced at the base of the plant, it may happen that the growth of the new rod is weak. It may be long-jointed, but thin, and not good enough to produce fruit-shoots. In that case the old rod will be retained for fruiting, and the new one to become stronger must be grown another year without being allowed to fruit. To show the economy of each rod being properly fruit-bearing: In a house 51 ft. by 16 ft., with a 10 ft. rafter, each rod can carry

24 lb. of grapes, and with the rods 4 ft. apart we have 24 rods. Therefore 24 × 24 equals 576 lb. of grapes, without crowding the vines or overcropping. Valuing the fruit at 1s. per pound for, say, 500 lb., we have £25, a moderate return. I have known the return to be considerably more.

As the heat increases a good lookout must be kept for *mealy bug, mildew,* and *red spider.* For the last-mentioned sulphur is the remedy. Any good method by which this could be effectively volatilized will serve the purpose. Dusting it on the foliage is the principal way in dealing with mildew. Using it as a check to red spider it is found most effective mixed into a paint with lime-water, soft-soap, or milk, and applying it to hot-water pipes. As we are now dealing with the cool vinehouse, a different method must be used. Procure a small kerosene-heater, such as used for boiling a kettle. On the top of this have a dish filled with wet sand, and another smaller dish on top of the sand filled with wet sulphur. Both sand and sulphur must be kept moist and watched carefully to prevent the sand from drying and burning the sulphur, as that would quite destroy fruit and foliage. When the house is filled with vapour the heater can be put out. Mealy bug can only be controlled at this stage as directed in the August number of the *Journal.* Keep the vine-borders well hoed—once a week is not too often—and do not be tempted to grow any plants on them. The more liberal the treatment of the vine-border and the higher the cultivation the less chance there will be of their requiring water, and the risk of cracked berries will be reduced.

The berries at this time may appear to be increasing in size very slowly. That is not, however, from any want of stimulant, if all-round treatment has been good beforehand.

The reduction of foliage must be carried out on the same careful lines as recommended in former notes. Bear in mind that the diffused light admitted by well-distributed foliage will suffice for the perfect colouring of the fruit.

In the Jordan Valley (Palestine), a semi-tropical region, lucerne, under irrigation produces ten crops a year. This district possesses a rich alluvial soil on limestone foundation.

A Beekeepers' Association has been formed at Geraldine, with a membership of forty. Mr. J. Gresham is the President, and Mr. T. Edwards the Secretary.

THE FARM GARDEN.

W. H. Taylor.

Vegetable-culture.

Tomatoes.—By this time plants will in all situations be set out. In some places they will be in free growth. In all localities blight is a danger, though some escape. I have long thought, and still think, that blight is to a large extent the result of improper methods and neglect. The thing to aim for is a well-grown but not over-luxuriant plant—a plant well exposed to sun and air in all its parts, there being no wasted energy in the production of useless shoots. A well-grown plant may be obtained in ordinarily good soil. It should be remembered that the tomato is naturally a very gross-growing plant. No animal-manure should be dug into the soil, as it is more than likely to induce a soft and luxuriant growth. The position should be an open one, and a free circulation of air should be secured by the rigid subjection of useless shoots. It is a common thing to see plants being allowed to grow as they like until there is a lot of green fruit, and then there is a wholesale cutting-away of shoots and leaves. The plants so treated seldom escape blight. Watering the plants is another mistake. In soil that is ordinarily good there is quite enough moisture, usually more than sufficient, and watering under those circumstances tends to produce the luxuriance it is desired to avoid. At this time it is necessary to determine in what manner the plants are to be trained. When they are to be trained to upright stakes the top of each plant should be pinched off, so as to start the necessary number of shoots all of the same strength. Some growers favour one stem only; in this case no pinching is required. Some use two stems, and others three. When one stem only is to be kept the plants should be closer than in cases where more stems are grown. 15 in. apart is plenty for single-stem plants, with rows 3 ft. apart. Personally, I do not favour the single stem. The plant can equally well support more, and it is an extremely difficult matter to make a single stem secure against injury by wind; whereas when two or three others are grown and these are passed round the stake in opposite directions they lock and afford each other support. Some think that as the single-stem plant is not pinched it will bear fruit earlier. This

opinion is not supported by experience. Having decided on the number of branches to be kept, and having secured them, see that these are not allowed to produce side shoots. Nip these off as soon as they are seen.

Parsnips and Carrots.—If the main supply be not provided for it is now time to get it done. There is plenty of time yet for them to develop good roots, but there should be no further delay, for it must be remembered that the surface soil is likely to get dry before long, and a good take may be difficult to obtain. The plan to pursue is to sow the seed very thinly. It is safe to do this now, for the soil being warm extra heavy rain is not likely to do harm, and slugs should not now be troublesome. Do any thinning that is required without delay, and keep the surface soil loose by cultivation.

Pickling-onions.—Many people use for this purpose the small bulbs usually found in ordinary crops that have not been well thinned. At best this is but a makeshift plan, for, besides being of uneven sizes, they have not the right texture of flesh. Proper pickling-bulbs are to be secured by sowing from now to the end of this month seed of pickling kinds on a rather poor piece of ground in a sunny position. Dig the ground carefully, break it up fine, tread firm, draw shallow drills about 12 in. apart, leaving just room enough for the hoe to work between. Sow the seed thickly and do not thin the plants. They will ripen in March, and should allow of selection in sizes, ranging from the size of a hazel-nut. The bulbs are silvery-white, even in shape, and more tender in flesh than the small ones first referred to. The tender texture enables them to absorb vinegar—an important point in pickling-onions.

Peas.—In the ordinary course two sowings will be made during the next four weeks.

French Beans.—One sowing each month is sufficient if the crop be closely gathered. Make sure that this is done, for growth stops immediately seed is formed. Any one wishing to save seed from desirable kinds should set aside a row or a part of a row for that purpose, and gather none from it, thus allowing the first formed to grow to maturity. Seed is thereby secured from the plants in their fullest vigour.

Red cabbages may be planted now. In sunny places planting may be delayed for several weeks yet. In other than favoured places, however, it is not safe. The red cabbage is less hardy than the green varieties, and will not heart in cold weather.

Beet.—Sow seed of the red varieties at once. In ordinary circumstances this is about the best time for all but the turnip-rooted sorts. These are sown earlier for use in summer. The long-rooted varieties are best for winter use, but if sown too early they grow to an unwieldy size. On the other hand, if left till much later the soil is likely to get too dry to enable them to reach a useful size. Like all the root crops, beet should not be grown on land freshly manured with stable manure, for it is liable to fork and form side roots. When the former happens they are useless. In the latter case they are rendered coarse. The best soil is that which was well manured last season for some other crop. The manure remaining is now only humus, and in that form it helps to keep the soil open and forms a congenial rooting-medium.

Cabbages and Cauliflowers.—Where the demand for vegetables is extensive a batch of cabbages put out during the next four weeks will be found very useful during the latter part of summer and autumn, though perhaps not required by an ordinary household when a proper supply of other seasonable things is provided for. In every case cauliflowers should be planted between now and Christmas, being one of the most valuable crops, coming in as they do when peas and beans are past and before broccoli are ready. A variety of Autumn Giant type should be planted. This is the true place for those varieties, and that is the time when they have the highest value.

Pricking out Plants.—*Broccoli* and *Brussels sprouts* must be well grown in order to give the best results. Stocky, well-rooted plants are secured by timely pricking out the young plants from the seed-bed into a patch of well-pulverized soil. Put them out about 4 in. or 5 in. apart. Here they strengthen and develop the lower leaves, which are often lost if left crowded in the seed-bed. It may be asked what reason there is for sowing the seed so thickly, and why the plants should not be given more room to save the pricking-out. Well, there is another reason why the pricking-out is better and worth doing in all cases — it breaks the taproot, and induces the formation of a dense mat of feeding-roots. This enables the plants to make a quick recovery when finally planted.

Sow seed of *Savoy cabbage* at once. The custom of raising this earlier is a mistaken one. The Savoy is coarse in flavour until cold weather prevails. It is essentially a winter vegetable.

Capsicums and *chillies* may be sown at once in the open ground in such parts as are warm enough to ripen the fruit. They are not suitable for cold places, the least frost being fatal to them.

Watering Seeds.—The custom of watering seeds after they are sown, whether it be vegetables or flowers, is bad, and usually results in the failure of the seed. When the soil is dry for seed, the best plan is to remove a little of the surface soil; give a thorough watering; sow the seed on the watered surface; and cover it with a little dry soil. The dry covering will prevent evaporation. Capillary attraction will draw moisture to the seed, and this will last long enough to cause germination. In the case of *lettuce-seed*, draw a drill; sow the seed; water the drill with the seed in it; and cover with the soil thrown out. A similar method with peas is far better than soaking the seed in water and then sowing it in dry soil. *Spinach* and *beet* seed are benefited by the same treatment.

Melons in Frames.—In all but the warmer parts of the Dominion the open-air cultivation of rock melons is either very uncertain in results or quite impossible. In any case, melons grown under glass, if properly grown, are always of finer flavour than those grown in the open, even in the most favoured places. Melons, grapes, and tomatoes are probably the only crops that can be produced under glass superior in flavour to those naturally grown. Like other things, however, to get the best you must give the best. Some directions for starting the plants were given in a former issue of the *Journal*. Two plants are grown under each sash. Each plant has two branches, and these are led towards the corners of the frame, one to each of the four corners. When the point of each shoot has reached its respective corner it is to be pinched out. Side shoots will spring into being, and these bear the fruit. One reason why glass-grown melons are of superior flavour is that as they are protected from rainfall the grower is able to regulate the supply of moisture to the roots. To grow them well the plants require considerable heat and light. No shading, therefore, is given. The green fruit requires abundant moisture and good feeding. This can easily be given. To ripen the fruit properly requires desert conditions. All water is withheld after the fruit has grown to a proper size. This demands that the fruit be all one age; otherwise withholding water would starve partly grown fruits. In order to secure fruit of one age artificial fertilizing of the flowers must be resorted to. Watch the plants, and about the middle of a sunny day when it is seen that there are plenty of both male and female flowers apply pollen from the male to the female flowers. The easiest and most certain method is: gather a male flower and tear off the petals; lay the remainder on the stigma of a female flower and leave it there. If fertilization be complete the female flower will wilt, and

the fruit will begin to swell rapidly. A sufficient number of flowers is to be set to provide the crop. On the day of setting give no water. About four fruits to each plant are usually sufficient, and as many as it is wise to attempt when they are desired to be of good size. When the fruit begins to grow all shoots appearing must be kept pinched. The roots should be well supplied with water given mostly in the early morning. Damp the foliage well just before the sun leaves the frame, either through the rose of a pot or with a syringe, and close up tight for the night. Do not ever neglect watering at this stage, or the damping of foliage on fine days. This is necessary to keep red spider away. Water is withheld when the fruit has sufficiently grown, and the latter is cut from the vines when a crack begins to appear round the footstalk.

Small Fruit.

In a former issue of the *Journal* I remarked that the loganberry is likely to become one of the most valuable of fruits for the country settler. It is interesting to note that according to a recent number of the *Journal of the British Board of Agriculture* the loganberry is taking an important place in England, being cultivated very largely for market purposes. The custom there is to renew the rods every year; whether that is an absolute necessity or not it does not say. I know that they will bear well twice in this country, and that it is an advantage to allow this when they are trained to walls. In England the only way of propagation appears to be by layers. In this country cuttings of the rods root quite easily. As the long rods now being produced will all bear fruit next season, a sufficient number should be kept for renewal.

Strawberries.—Keep the ground loosened by surface cultivation, unless it be mulched. Prevent the indiscriminate production of runners. Any one desiring runners for future planting should secure them early, and after providing sufficient keep all others cut off. One or two plants at each runner is better than a larger number.

Gooseberry-bushes.—At this time a little attention in subjecting growth which may be going the wrong way and in fostering shoots going in the right direction may save much trouble and annoyance in future. Varieties that are naturally of an upright habit of growth present no difficulties. Break out gross shoots in the centre of the bush, and keep a sufficient number on the oustide, directing them outward and upward. Drooping varieties are more difficult to manage. With these also keep the centre clear, and select on

the outside shoots which show an upward tendency, and pinch them occasionally, so as to stiffen them and keep them up. The time to pinch is when the tips begin to incline downward. Then pinch to an inside bud, and the next shoot will grow upward.

Raspberries.—Keep suckers down between the rows. Dig them out if possible; it saves time after. It is almost useless to cut off the tops; in a week or two they are up again. A mulch of strawy manure is useful, as it helps to keep suckers down, preserves moisture, and, if the soil be any way stiff, keeps it in good condition by protecting it from trampling feet.

Flower-culture.

Seed-sowing in the open ground should be completed at once. This refers to such flowers as *asters*, *salpiglossis*, *phlox*, *ten-week stocks*, *zinnias*, *celosias*, *nemesias*, and others of a like nature. All these succeed admirably if carefully sown in suitable soil. In watering treat the seed as advised in the vegetable-culture section of this article. However, unless the soil be exceptionally dry, watering will not be necessary, and I will say that more losses occur through watering than for want of it.

Chrysanthemum-planting should be finished at once, particularly where large flowers are the object. In many ways this plant is very accommodating, and in intelligent hands can be made to fill many parts. A plant which roots from cuttings so freely as the chrysanthemum is bound to be amenable to many uses. For instance, where there is a good stock plants may be grown in a way that will admit of their being lifted in autumn, just as the buds are showing, and planted in numbers for garden display in conspicuous places which have been filled with other plants during summer, thus livening up otherwise dull places for several weeks in the fall of the year. When there are a number of surplus plants left over after planting, they may be treated in this manner—it is a plan I have found useful: Dig out a trench or more in the vegetable-garden, as in the case of celery, but not quite so deep. In the bottom of the trench dig some old manure or leaf-mould. What is wanted is not so much feeding-material as something that will encourage the formation of a mass of feeding-roots. Either leaf-mould or very old manure will do this. Put the plants out in the trench about 12 in. apart. When they begin to grow pinch the tops off. Do the same again when the new shoots have made about 6 in. of growth. These plants will lift quite well at the

time indicated, and can be planted anywhere, or even placed in pots.

Plant out *box stuff*, in the latter half of the day for preference. This is not of much importance with well-rooted plants, but many times success is more sure if night follows quickly after planting. When planting, brush aside loose dry crumbs on the surface. These falling about the tender roots are likely to injure them, and at best they contain no moisture and lie loosely about the roots, which are likely to perish. With these loose, dry crumbs out of the way, the roots are surrounded by the moist, soft soil beneath, and they quickly take hold and recover from the check of shifting. This plan is far better than watering the plants, and success is far more certain.

Rhododendrons, *azaleas*, and *camellias* make their growth after flowering. Next season's flowers depend on the growth made at this time. A good mulch of manure will be beneficial, rain not being so frequent now. There is no danger of too much being washed in, even if it be strong. Its chief use will be the protection it affords from drying influences of sun and wind, and eventually the remains of the manure, being a black mould, will encourage and foster the roots. All flowering-shrubs as they go out of flower should be pruned into shape. There need be no fear about cutting well back, for if done at once the resultant growth will have time to mature for flowering at the usual time.

Banksia roses as they go out of flower may, if crowded, be relieved of the old branches. Lay in new rods in place of those removed. These will flower perfectly next season. Preserve new rods on other climbing roses, tie them in loosely, with a view to removing old branches next winter to make room for the new rods.

Some time ago two brothers in Jaffa conceived the idea of furnishing the bees with material for honey-making purposes through eight months of the year. Camping first at a low altitude, they waited until the flowers of that locality were over, and then conveyed the hives on camel-back to a higher place, thus following up the consecutive blossoming of different flowers. They were even able to separate the honey of those overworked bees into "orange-blossom honey," "thyme honey," and so on with each succeeding flower. The experiment has been sufficient to show how well capable is this ancient land of honey-production. By using modern extracting machinery and replacing the combs, 100 hives were made to yield 6 tons of honey in the year.

THE POULTRY INDUSTRY.

F. C. Brown.

December Work.

Next month the poultry plant will be carrying its greatest number of stock, with the consequent risk of overcrowding in many parts of it. As the growing stock demand ideal conditions for their best development, any old birds, unless considered really profitable, should be marketed without delay. While many of the fowls should indicate if they are past their profitable laying season, some discrimination should, of course, be shown with regard to those which should be disposed of. The best guide in culling the laying bird is to discard any showing weak constitution. There will probably be many old birds which take a rest in December and then lay well for a brief period before going into the moult. The poultryman with a keen eye for a bird should be able to detect readily those birds taking a temporary rest; but if he cannot he will find the pelvic bones a fairly good indication of whether a bird is taking only a temporary or a prolonged rest. While the width of the pelvic bones as a guide to laying-capacity is quite useless, it is nevertheless a fact that the position of these bones is a fair guide as to whether the bird will lay in the immediate future or whether she is taking the usual rest before moulting. When the bones are close together and the breast-bone close up to them it may be taken for granted that the bird will not lay for some time, and therefore will be unprofitable to keep; whereas if the pelvic bones be well apart and there be a good distance between these and the breast-bone, with a fullness of the abdomen, it may be reckoned that the bird will soon come on to lay, and is therefore well worth retaining in the flock until she shows signs of moulting. Of course, the man with a trained eye does not require to examine the bird at any time to discover whether she is in a laying condition or not. It is usually discernible whether the laying season is on or about to commence by the shape of the fowl. In a bird about to take on a long period of rest her abdomen naturally shrinks, and the bird will appear to have much longer legs than when she is in a full laying condition. On the other hand, where the bird will resume laying in a brief period or is in a full laying condition the width and

depth of the abdomen clearly indicate it. This is not to say that the abdomen is the egg-basket, but rather that the development of the egg-cluster causes the intestines to fall, and this presses out the abdomen. Therefore when the abdomen appears to be full and deep it may be taken for granted that the ovary is in a forward stage of development, and the bird is either laying or near the point of it.

A common mistake made is not to market birds until the moult has practically set in or until they have just got over it. They should be marketed immediately they commence to take their rest prior to going into the moult. With the old birds which appear to be near laying-point, and which are not to be marketed until they reach the moulting period, forcing for egg-production is desirable in order to get all the eggs out of them in the shortest possible time. There should be no sentiment in this matter. Even if an odd bird should show the effects of the forcing conditions, in the way of ovarian troubles, &c., it will pay to destroy it rather than retard the laying of the others. On the other hand, the birds from which next season's breeders are to be selected should not be forced, nor should there be any endeavour to make high records. Such birds should be kept in a healthy, thriving condition. It has to be remembered that they have the moult to go through, which is in itself a considerable strain on the constitution. This must be made good before the breeding season, as if the birds are to leave profitable stock they must have the necessary vitality inseparable from good health before being placed in the breeding-pen.

When considering the birds that are to be kept for next season's breeding operations it is a good plan to have trap nests, so that birds which lay small or badly shaped eggs may be discarded and their places taken by better stock. The small-egg question is becoming a serious matter, and there is no better way of raising the standard of eggs than by eliminating from the breeding-pens birds which lay eggs of an undesirable size. No male bird should be in the breeding-pen unless he is the son of a mother that laid good eggs.

Mortality in Chickens.

I am still receiving many complaints as to mortality in chickens. In some cases the numbers lost are few, in others the loss is considerable. The trouble is seldom of long duration. While I am always ready to give personal advice it is not always practicable for me to do so. I would strongly recommend, therefore, that immediately any trouble appears among the chickens the owner should open them up himself and endeavour to discover the cause. For instance,

after reading Mr. Cussen's article in the September issue and noting his condemnation of sand for chickens, a reader of the *Journal* who uses sand and has had considerable mortality this year with his chickens made a post-mortem examination and found that the sand was the trouble. The only class of sand he could secure contained small, bright particles which, as where the Ruakura sand is used, collected in the gizzard with fatal results. In several cases of heavy mortality among chickens I have found on opening up a number of affected ones that they had been killed by eating the whole oats in oaten chaff. In this case and in that of the sand the poultryman himself could easily discover the cause of the trouble.

Shelter.

There is time even now to plant some shelter for the young growing stock, if this very necessary provision has not been made already. There is nothing better for the purpose than Jerusalem artichoke, which grows very rapidly and is much appreciated by the birds. Within a few weeks it will make sufficient growth to provide shelter, while the birds will find both exercise and feed in securing the young leaves, of which they are very fond. Sunflowers have rather gone out of fashion. This is a pity, as planted outside the runs they form a certain amount of shade and provide excellent winter feed when ripe. Another quick method of providing both shade and shelter is to grow tree-lucerne, though this should have been planted ere now. There is nothing which gives such effective shelter in a short time as this.

Green Feed.

Poultrymen generally will be well advised to give more attention to green feed. Reference has again and again been made in these notes to the value of lucerne. The successful establishment of this plant, however, requires some prior preparation of land, and where the season has reached its present stage it is well to provide a substitute. An excellent plant for the purpose, and one easily grown, giving a great wealth of feed right throughout the year, is silver-beet. Where watercress is available this is an admirable feed—in fact, nothing is equal to it where a good colour in the yolk of the egg is desired. For young chickens it is admirable. There is, as a matter of fact, a great variety of plants to select from for green-feeding purposes. Rape and green oats (cut when short) are very good. I would, however, strongly recommend silver-beet.

DUCK-REARING.

A. Carr.

There is an ever-increasing demand for good table-ducks, and nothing will pay better than duck-rearing under proper management. Many complaints are made as to the greater difficulty of rearing ducklings than chickens by artificial means, but in my experience the reverse has been the case. The Pekin and Aylesbury varieties are usually the best for the table-poultry trade, but the methods of rearing ducks outlined below apply equally well to all breeds. I would emphasize the fact that no special knowledge is required to make duck-rearing a success. Careful attention should be given to the necessary details, especially when the birds are in the first stages of development, together with strict cleanliness throughout the breeding operations. I am convinced that if the rearing of ducklings were better understood this phase of poultry-keeping would become most popular and prove one of the most highly profitable branches of the business.

One factor tending to more economical production in duck-raising as against chicken-raising is that no grain requires to be fed, and that a mash forms the staple article of diet. This can be bulked up very largely with inexpensive materials, of which green feed—lucerne for preference—and vegetables are the features.

In the work of incubation any good machine will answer the purpose. The incubator should be run as near as possible at 102° for the first eighteen days, and then raised gradually to 104° until the hatch is over. Duck-eggs take twenty-seven days to incubate. The eggs should be of good medium size and as fresh as possible. Commence turning the eggs on the third day, opening the ventilators, which should have been kept closed until then. Make the first test on the fifth day, turning out all infertile eggs. Turn the eggs twice a day. Moisture should now be given, either water or damp sand in shallow pans, until the eggs show the first signs of pipping. Remove the water, and spread over the tops of the eggs a piece of blanket dipped in warm water. Then close down the machine until the hatch is over. Always keep a careful watch on the air-cells of the eggs, and air the eggs when turning. Remember that the air-cell can always be brought down to the right size, but if too low it cannot be raised again. Make a second test on the fifteenth day, and the third and last test on the twenty-fourth

day. Leave the ducklings in the incubator for thirty-six hours, and then remove them to the brooder in a warm basket.

The question of warm or cool brooding depends a great deal on the number of stock required to be raised and the room at one's disposal. For the rearing of large numbers a good brooder-house is necessary, but this may be used either with or without the hot pipes usually installed. For small hatches of ducklings it is quite a simple matter to rear them in an outdoor brooder, or even a well-made coop, with very little trouble. The hover may be a square box, the floor being covered thickly with sand, with a frame on top so as to rest lightly over the ducklings. Across the front a double curtain is tacked, with a slight opening in the middle as an entrance. Close attention is advisable for a day or two to prevent the birds losing their bearings, but if they are gently pushed into this sleeping-box once or twice after feeding there will be very little trouble.

Still more easily managed is the round adjustable hover, with its woollen curtain, barely touching the sand, cut up at regular intervals and having a slightly larger opening made here and there so that the birds cannot fail to find their way in and out. The round hover is best placed near the one corner of the brooder, but not too close in. The ducklings should be placed in at about dusk.

Ventilation is the most essential point to be considered in either cool or warm brooding, and ducklings require plenty of fresh air even more than chickens. This must, however, be left to the discretion of the breeder. A careful note of the general appearance of the birds early in the morning is of great assistance in this connection.

Another important point is the location of the breeding operations. This should always be on level ground and on a nice dry situation, with plenty of natural or other shelter from sun and rain.

There are various methods of feeding, but the very simple one here given has proved most successful: For the first few days a very light mash of two small measures of bran to one heaped measure of pollard, mixed with milk and not quite so dry as for chickens, should be fed. Keep a little by them for a day or so, but do not coax them to eat. Then feed regularly four times daily just what they can finish up. A little coarse sand should be mixed with the food until they are a week old, and then a liberal allowance always left near for them to help themselves. On the third day the mash should be composed of equal parts of bran and pollard, and, if convenient, may have a further addition of stale bread soaked in milk added to it. During the second week a little minced meat should be added to the mash and increased in quantity

very gradually, as well as chopped green stuff once a day. A little bone-meal is excellent, especially where space is limited and the runs are necessarily small.

Where the aim in view is the building-up of first-class stock birds good feed is of the greatest importance, and for all young and growing stock fair-sized runs on clean ground are highly desirable.

The mash given above will be suitable for quite three weeks. After that it may be altered to either two parts pollard to one part bran, or equal parts of maize-meal, pollard, and bran, well mixed with cold water. With regard to water for ducklings, care should be taken to provide drinking-fountains of sufficient depth to allow of their getting their heads in but not their bodies, the more shallow ones used for chicks not being suitable. After some ten days a shallow tin dish with water an inch deep for them to play in is a great attraction and helps to strengthen their legs. A handful of coarse sand thrown into it will be found beneficial.

After the ducklings are a month old they should be fed three times a day with a good mash consisting of two parts of pollard, one part of maize or pea meal or barley-meal, and 10 per cent. blood-meal, mixed with cold water. The mash should always be fed in troughs, never on the ground. Chopped green food should be given twice a day, fed separately, and always have plenty of grit and clean water before them.

In contrast with other birds on the farm, ducks of all ages roam at night, and should therefore have clean drinking-water and grit always available.

In districts where there are stoats and weasels great care should be taken of the ducklings until they are nearly three-parts grown, otherwise large numbers will be killed by these pests.

If possible, breeding-ducks should have water to swim in, and this greatly strengthens the fertility of the eggs.

Ducks for market should be kept with only water to drink, and this only deep enough to get their heads well in, with grit at the bottom. They should be well fed from the start, and kept in well-sheltered pens of medium size. Not more than thirty-six should be in each pen, as young ducks, if suddenly frightened, are liable to stampede, and numbers will thus be crushed to death by the others. Do not allow dogs or strangers to go among them, while attendants should be cautious in their movements. Always talk to the little ones when attending to them. Ducklings are easily trained.

Young birds should be ready for the table in ten, and not later than eleven, weeks.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—" Application for Advice as to Manurial Treatment of Soil"—obtainable from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith.

Manufacture of Cheese from Pasteurized Milk.

Mr. Reginald W. Naylor, Ahiaruhe, Carterton :—

Can you inform me whether in any issue of your *Journal* an article on the manufacture of cheese from pasteurized milk has been published ? I wish to become acquainted with the methods adopted in this country. Could you supply me with information to that end ?

The Dairy-produce Division :—

This Division has not yet issued any printed matter dealing with the pasteurization of milk for cheesemaking.

Quite a number of the cheese-factory managers have treated small quantities of milk in this way when making up exhibits of cheese for competition at shows, and on a small scale the process has been more or less successful. We are not yet in a position, however, to recommend it for ordinary factory practice, and before we could do so it would be necessary to carry out some exhaustive experimental work covering a whole season, in order to devise the best means, to find out what the cost of pasteurizing would be, and to ascertain the market value of the finished product as compared with the unpasteurized article. We had hoped to undertake this work during the present season, but owing to our being short-handed it has had to stand over in the meantime.

It may be mentioned that some very exhaustive work of this kind has been carried on at the Wisconsin Experimental Station in the United States, but the investigators are not yet prepared to recommend the adoption of pasteurization by cheese-factories.

Plant for Identification.

" Prairie Farmer," Te Puke :—

Under separate cover I am posting you a specimen of plant for identification. Please tell me if it is *Melilotus alba* or white melilot (sometimes called " Bokhara clover "). It is said in Illinois, U.S.A., that the bacteria of wild *Melilotus alba* (or, as they call it, " sweet clover ") is the only other bacteria that will inoculate for lucerne. Has your Department had any experience on that point ?

The Fields and Experimental Farms Division :—

The plant sent is not *Melilotus alba*, but a small native plant of the geranium family (*Oxalis corniculata*). *Melilotus alba* is an entirely different plant, somewhat resembling a large coarse specimen of lucerne, but with larger leaves and white flower. *Melilotus alba* is regularly used in the United States of America as a preceding crop to lucerne, the bacteria being the same with each plant. The Department has not tried the experiment.

Clover for Pasture.

Mr. R. Morrison, Lower Kaikorai, Dunedin:—

Which is the best month to sow clover-seed? Which is the best kind? What do you think of crimson clover? I have half an acre that has been ploughed since May and is now ready to break up. I have been told that autumn was the best time to sow. I have a cow for which I want a good pasture, and I thought a clover one would be the best.

The Fields and Experimental Farms Division:—

When the land is free from weeds, clovers do well if sown in spring (October). If the land be not now in a suitable condition, autumn sowing would be preferable, sowing in the month of March. Crimson clover is not so much used for feeding purposes as for growing to plough in to put organic matter into the soil. Cow-grass or white clover would be a better clover to grow for cattle-feed.

Lucerne.

"Subscriber," Flaxton:—

Do you think it would be advantageous to sow, say, oats with the lucerne-seed as with grass-seed as a check against weeds? I saw this recommended in a dairying journal and would like your opinion on the matter.

The Fields and Experimental Farms Division:—

The practice of sowing a nurse crop with lucerne is not recommended. The experience is that when lucerne is sown in drills about 14 in. apart so as to allow of inter-cultivating the weeds can be checked successfully.

Applying Inoculated Soil.

Mr. L. Cox, Te Kapa:—

How many 2 cwt. bags of inoculated soil are required for 200 square yards of ground?

The Fields and Experimental Farms Division:—

12 lb. of inoculated soil will be sufficient to treat 200 square yards of ground.

Dairy-farming.

"Subscriber," Te Kowhai, Waikato:—

1. What is the cause of red water in cows, and what is the best cure?
2. Do you consider it increases the milking-capacity of a heifer to strip before calving?

The Live-stock and Meat Division:—

1. An article on red water appeared in the *Journal* for September, 1912, a copy of which has been forwarded to you.
2. No.

Swedes.

A. L. N., Mokoia:—

I intend breaking up a small paddock which I have just stumped. It has been down in grass and has run out. About 2½ acres I am going to put in swedes. The land is a heavy dark soil, good depth, with a subsoil of clay which in time forms papa. Please let me know—(1) The best swedes to sow (name), also amount of seed; (2) manure, if any, and quantity; (3) best time to sow (crop for winter feed fairly early).

The Fields and Experimental Farms Division :—

There are, of course, several good varieties of swedes. One that has done well in the Taranaki District is Garton's Superlative. Sutton's Champion is also a good variety. Either of these will probably suit you.

A suitable manure would probably be equal parts of bone-meal and superphosphate, with about one-fifth the weight used of these materials added in the form of sulphate of potash.

The best time to sow depends upon what kind of a season it is going to be, which, of course, there is no way of arriving at. When it is intended to leave the roots in the field and they are required for late feeding, it is not advisable to sow too early. If, however, it is intended to store the roots, this point, of course, can be disregarded. Both November and December (early) are, as a rule, favourite months for sowing this crop.

In the matter of manuring, if there is reason to believe that the land is out of heart (and probably lacks lime) it would be advisable that some considerable time before the crop is to be sown, very early in the season, soon after the land is ploughed, 1 cwt. to 1½ cwt. per acre of basic slag be drilled in through the drill to a fair depth, and mixed with the soil by the cultivation following, and later on that the crop be sown in the usual way with the mixture suggested.

Tussock Country.—Lice on Horse.

"Bankside," Lowlands, Bankside, Canterbury :—

1. Is it advisable to burn tussock country before ploughing, or should tussocks be ploughed in ? The land in question is strong and cannot be ploughed deep, and a large number of tussocks come to the top with harrowing.

2. What is a good cure for lice on a horse that has been turned out and is poor in condition ?

The Fields and Experimental Farms Division :—

1. Before ploughing tussock land it is best to burn the tussocks off. This is the usual practice.

The Live-stock and Meat Division :—

2. Dressing with any of the ordinary coal-tar sheep-dips will kill the lice, the strength being the same as that advised for sheep. Choose a warm day, and with a stiff brush rub the dip into the hair all over the animal. This dressing will kill the lice if properly applied, but will not kill the eggs or " nits " These hatch out in about eight days, and it is then necessary to dress the animal again to kill the newly hatched lice. It may even be necessary to dress again in another nine days' time. If the animal has been wearing a cover, this and all stable utensils used should be thoroughly soaked in the dip.

Wood-lice.

Mr. L. Cox, Te Kapa :—

What is a good thing to eradicate wood-lice which are seriously damaging rhubarb ?

The Orchards, Gardens, and Apiaries Division :—

Frequently disturbing the soil by cultivation will cause wood-lice to disappear. Water near boiling-point kills them instantly, but when hot water cannot be used a teaspoonful of Condy's crystals dissolved in a gallon of cold water will kill them without injuring the plants.

Black-wattle.

Mr. George Emtage, Motu Ora Island :—

How far apart in the row should black-wattle stand ?

The Orchards, Gardens, and Apiaries Division :—

There is no definite rule as to how far apart in the row black-wattle should stand. It is advisable to plant the seed rather thickly and thin out as required.

Lucerne.

T. H. J., Mount Hassall, H.B. :—

Please let me know whether your Department is going to supply lucerne-seed, &c., on the same conditions as in previous years to farmers who wish to experiment with lucerne in their districts. If so, what are the conditions on which you supply same? I should like to try 1 acre under Government supervision. I am enclosing an analysis of our soil, and we are from 1,400 ft. to 1,600 ft. above sea-level. Perhaps by the above you can advise me whether lucerne is likely to grow on our land. The subsoil is of chocolate colour, and is on limestone in thickness in the gullies from 10 ft. to 40 ft., which is from 2 ft. to 20 ft. below the surface. The subsoil is very soft right down to the limestone. We are about thirty miles from a railway-station.

The Fields and Experimental Farms Division :—

The Department has decided to renew its offer of last year to supply approved experimenters with sufficient seed, soil, and lime to cultivate an acre of lucerne, free of cost, the only expense to the experimenter being transit charges on the material. The Department supervises the experiment. There is nothing in the analysis given by you to indicate that the soil is unsuitable for lucerne-growing, the success of which is dependent on many factors other than those shown in the analysis.

Green Feed for Cows in Summer.

"Green Feed," Feilding :—

I want some kind of green feed to give my cows in summer when the pastures are dried up. In one number of the *Journal* I noticed that Hungarian millet was advised. I do not know it, but I suppose it is similar in character to maize. I have tried maize, but find it takes too much out of my soil (light), and, even with manuring, it is a couple of years before I can get anything of a crop after it, and so, if millet is anything like it, I must leave it out. I did think of trying vetches. Would they be better, or can you recommend any other crop? Any information, manure, date of sowing, and cultivation would be acceptable.

I have a small paddock of about 1½ acres which was in rape last season. I would like to try it in lucerne: would you advise it? It will almost certainly require lime. What other manures would you recommend for light soil, and in what quantities, and when would you apply them? Could I get inoculated soil from the Department? If so, when? What quantity would it take, and at what price, and when would you apply it? Is there any difference between New Zealand and Hunter River seed?

The Director of the Fields and Experimental Farms Division :—

I would not advise growing Hungarian millet for green feed in your district, as it ripens quickly, and is inclined to take too much out of a light soil. A good crop to sow is 2 bushes vetches and ½ bushel ryecorn to the acre, sown in the autumn in land well cultivated. For manure use superphosphates, 1½ cwt.; basic slag, 1 cwt.; sulphate of potash, 28 lb. to the acre, to be mixed thoroughly and used immediately after mixing. Scotch tares may be sown at once, if land is prepared and in good condition. They can be purchased at 11s. 6d. per bushel.

Lucerne may be tried after rape providing the land is fairly clean and no stalks sticking up. It is necessary to have a clean bed for the seed, and everything must be buried deeply and ample drainage provided for. Apply 1 ton fine ground limestone per acre—10 cwt. before ploughing and 10 cwt. when ploughed. Then harrow. For manure use superphosphate, 1½ cwt.; basic slag, 1 cwt.; sulphate of potash, 20 lb. Seed, 15 lb. per acre, in drills 14 in. apart. Apply when to all appearances frosts are over for the season. This would probably be the second week in November. Harrow frequently to check weeds before sowing.

There is very little difference between New-Zealand-grown lucerne-seed and Hunter River seed; in fact, the majority of the seed originally used here was of the Hunter River variety. Cases have been brought under notice where the New Zealand seed has done better than Hunter River.

At the present time the Department is prepared to supply approved experimenters with sufficient seed, soil, and lime to cultivate an acre of lucerne, the only cost to the experimenter being the freight on the material.

Fruitgrowing.—Shelter.

Mr. R. Alfred Grace, Tongariro, Tokaanu, Lake Taupo :—

Will fruit-trees, such as apples, pears, plums, quinces, apricots, and peaches, also gooseberry-bushes, grow well on sandy soil in this district, and where water starts to appear about 30 in. down in the winter-time? If so, what kind of manure should I use, and what quantity, and how am I to apply same?

Also, what is the best kind of hedge to plant round a homestead and an orchard to serve as a protection from the wind, &c.—one that will not affect the fruit-trees in any way (such as fruit-tree complaints, &c.), and will grow nice and thick if kept clipped, and is also an evergreen? And how far apart same should be planted, and manured, &c.; and whether it will grow well on sandy soil?

The Orchards, Gardens, and Apiaries Division :—

Apples, pears, plums, quinces, apricots, peaches, and gooseberries should do well at Tokaanu. A mixture of 2 cwt. superphosphate and 1 cwt. bonedust is perhaps as good as anything. A handful or so of this mixture should be sprinkled not over the roots, but in a circle just outside the radius of the shortened root system, in order to induce the fibrous rootlets that will be formed to push out in search of plant-food, and, after assimilating the manure provided, reach further afield.

Eleagnus japonica makes an excellent hedge. A double row of plants is preferable to a single one, with the plants 2 ft. apart each way. With regard to manure, use the same mixture as for fruit-trees.

Cow Troubles.

"Subscriber," Churchill :—

What is likely to be the cause of a cow turning her head towards her udder at intervals, mooing at the same time, as though there was a calf near by. I may state that I have drenched her three times now. She has calved about a fortnight, and as far as I can see her udder is quite healthy.

The Live-stock and Meat Division :—

It is difficult to say why she does it. The fact of the udder being healthy would preclude the idea that pain was the cause. If she has been sucked by a calf, and it has been taken away, she may be looking for it. Drenching would not appear to be of any use.

Washing Locks, Pieces, and Dags.—Erecting Small Wool-wash.

Mr. W. Thorp, Waitewhena :—

I am thinking of washing my own locks and pieces and dags in future, and should be glad to get any information as to procedure, cost of erecting small wool-wash, style advisable, and so forth. If you have any information available I think it would be of great interest and use, not only to myself, but also to other subscribers to your instructive *Journal*.

The Director of the Live-stock and Meat Division :—

Mr. R. Tremain, of Tinwald, Ashburton, has kindly supplied me with the following information regarding the erection of a small scouring plant :—

"When putting up a small scouring plant for washing locks, pieces, &c., the most necessary thing to have is a good flow of clear fresh water, and secondary a good fall for the water to get away after it has been used. Without these it is no use trying to do any scouring. The cost of putting in a small plant that would serve the needs of a place of ordinary size should not cost more than from £15 to £20.

"The ordinary plant is not very extensive, and need not be very elaborate. You will require: one 400-gallon tank set up in brick for boiling the water; and two tubs, one for holding the hot water and the other for holding cold water. The dimensions of these tubs or boxes are 5 ft. 6 in. long, 3 ft. wide, and 2 ft. 6 in. deep. The tubs should be placed fairly close to each other, so that the wool can

easily be lifted from one to the other in one handling, and yet to allow a man room enough to work at each tub.

"The tubs should be let into the ground to within a foot of the top. A boarded platform should be built some distance round the tubs, so that the men working at the tubs can keep their feet dry. The tubs are to be under a roof for the shelter of the men, but the sides can be open.

"The hot-water tub should be near the tank, so that the hot water can be let into the tub when required without much trouble. The tub should have a slide and also a perforated-zinc slide, so that it can be emptied of water easily. The cold-water tub should have almost the whole of one end covered with perforated zinc and a false slide in front, to allow dirty water to get away freely, and at the other end a slot to allow the water to enter the tub.

"About fifty wool-sheets will be required for drying the wool on. The cost of these sheets will be 6s. each. It takes three men to run an ordinary wool-wash—one at the hot-water tub, one washing at the cold-water tub, and one sorting, &c. The wool-shed could be used for any shed accommodation that may be required."

LUCERNE.

MR. RALPH STEWART, Tokomaru, Manawatu :—

With what success has lucerne been grown in the Dannevirke district, especially Mallaman? The soil is a chocolate loam, with metal subsoil. It is ground that if it rains one day the plough can be used the next.

Will the grass-grub attack lucerne?

The Fields and Experimental Farms Division :—

There is no reason why lucerne should not be grown on most of the well-drained soils of the Dannevirke district, provided proper preparation be given to the land and due care be taken with the young crop until it becomes established. If the soil is very deficient in organic matter a green crop should be ploughed in.

Lucerne requires plenty of lime and plenty of potash and phosphoric acid.

On a light soil it is a good idea to sow oats and vetches with manure quite early in autumn, having previously given the land half the quantity of lime which it is intended to apply for lucerne. Feed this off, and later on plough under to a fair depth a good second growth. Then apply the balance of the lime, and gradually prepare the land for lucerne, which should be sown with suitable manures for the crop and country on which such crop is to be grown.

The grub does not do much damage to mature plants. It may injure them in the quite early stages.

WHEAT.—MAIZE.

"NULLI SECUNDUS," Waikawa Valley :—

Please inform me how far south wheat is grown, also maize. Would they, in your opinion, grow here?

The Fields and Experimental Farms Division :—

Wheat is grown in Mataura River Valley south to Mataura Island, in New River Valley to Wallacetown, and Jacob's River Valley to Riverton.

Maize has been successfully grown as far south as Balclutha, but we have no knowledge of any being grown in Southland.

CABBAGE-TREE.

"INQUIRER," Hutt :—

Would a cabbage-tree about 6 ft. high die if replanted?

The Director of the Orchards, Gardens, and Apiaries Division :—

Cabbage-trees may be safely removed provided care be taken in the operation. Should the tree seem to die, leave it for two seasons. I have known them break in the second year after transplanting.

BREAD FROM STONES.*

B. C. Aston, F.I.C.

Under the above epigrammatic title Dr. Cyril G. Hopkins, the head of the Agronomy and Chemistry Department of the Illinois University, relates his experience as farmer and chemist—a happy combination, and one presaging a successful issue for any agricultural work undertaken under such direction.

The property known locally as "Poorland Farm" was purchased in 1903 at less than £4 per acre, and consisted of poor grey prairie land with a few acres of timber land. One particular field which had been agriculturally abandoned five years prior to 1904 was bought at £3 per acre. It was then covered with a scanty growth of red sorrel, poverty-grass, and weeds. A generous treatment with ground limestone and finely ground raw phosphate rock was followed with a six-year rotation, including one year each of corn (maize), oats (or cow-peas), and wheat, and three years of meadow and pasture with clover and timothy.

In 1913 the 40 acres produced 1,320 bushels of wheat, the actual yields being as follows: 1½ acres with farm manure alone (six loads per acre) produced 11½ bushels per acre; 1½ acres with farm manure and one application of ground limestone (2 tons per acre) produced 15 bushels per acre; 36 acres with farm manure and two applications of ground limestone (2 tons each per acre) and two of finely ground phosphate (1 ton each per acre) produced 35½ bushels per acre. The above manuring is, of course, that spread over the ten years.

Dr. Hopkins calculates the average total annual cost of the limestone and phosphate, including haulage two miles from station, freight, and labour, to be 7s. 1d. per acre per annum. He concludes that the application of these two natural stones (limestone and phosphate) brought about the production in 1913 of 864 bushels of wheat, sufficient to furnish a year's supply of bread for more than a hundred people.

It is to be noted that finely ground raw rock phosphate containing from 23 to 32 per cent. phosphoric anhydride (P_2O_5) can be obtained from at least thirteen companies at from 10s. 5d. to £1 0s. 10d. per ton, delivered in bulk on the cars, the price varying with the quality; and ground limestone can be obtained at 2s. 6d. per ton from any of twenty-nine companies scattered over the State.

* Circular No. 168, University of Illinois Ag. Expt. Stn., Sept., 1913.

THE WEATHER FOR OCTOBER.

D. C. BATES.

THE month was one of seasonable weather, for, although dull skies were frequent, both precipitation and temperature were about the normal. The greatest positive difference in the former was accounted for in the southern extreme of the South Island, this owing to the heavy rains on the 29th and 30th.

None of the atmospheric disturbances were of remarkable intensity such as to cause storms of a severe character.

Westerly areas of low pressure passed in the South on the 3rd, 8th, and 16th, and immediately following these dates cold southerly winds were experienced. The strongest southerly, however, in the east coast districts occurred on the night of the 18th, in connection with a depression centred off East Cape, and between the 15th and the 19th of the month conditions were generally very unsettled.

DISTRICT NOTES.

District. *Chiefly from Telegraphic Reports.*

1, 2. The weather was generally fair, the total rainfall being about the normal or slightly below. On the last day of the month heavy rain was recorded; otherwise precipitation was usually of a showery nature. Boisterous conditions prevailed on the 18th, 19th, and 20th, with west to south-westerly gales.

3. In this district the rainfall averaged about 30 per cent. below the normal. With the exception of a few days about the middle of the month, fair to fine weather was the predominating feature.

4. Although a mild month, a considerable amount of dull and showery weather was experienced, especially in the latter half. However, the aggregate rainfall was not excessive, the difference from the normal varying slightly in both a positive and negative direction. Some heavy falls occurred in the high country on the 16th and 17th, and again on the 22nd and 23rd.

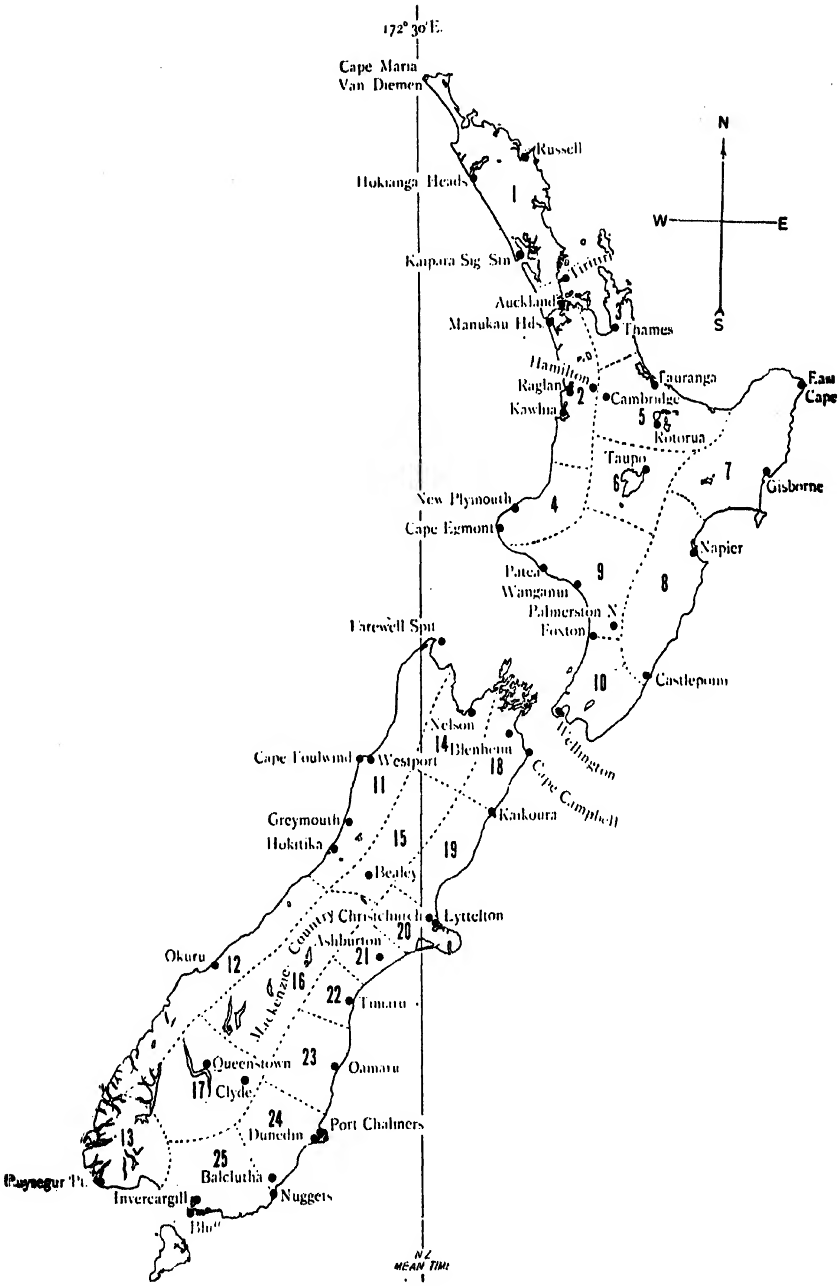
5. Fair weather ruled, and the total rainfall was about 45 per cent. below the mean for October. Some stations measured good amounts on the last day.

6. The wettest day appears to have been the 23rd, when some stations reported over 2 in. Changeable and showery weather prevailed, and the month's fall was about the normal.

7. About 15 per cent. below the average rainfall was recorded. No particularly heavy falls occurred, the total being distributed over about twelve days. Fair to cloudy weather was experienced.

8. Owing to two very wet days—viz., the 11th and 23rd—the month's aggregate in this district was in excess of the mean by about 50 per cent. Most stations recorded over 1 in. on the latter day, and in a few cases over 2 in. On the 18th a thunderstorm was experienced in parts. Generally the weather was not unseasonable.

9, 10. In both these districts cloudy and gloomy weather preponderated, and the rainfall was in excess of the average, the difference ranging from about 12 to as much as 45 per cent. High southerly winds were experienced on the 11th, 12th, and 19th, and heavy rain fell on the 18th, and in parts on the 23rd. A sharp frost was registered inland on the 4th.


172° 30' E.
Cape Maria Van Diemen
Russell
Hokianga Heads
1
Kaipara Sig Stn
Auckland
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3
Hamilton
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2
Kawhia
Cambridge
Tauranga
5
Rotorua
East Cape
Taupo
6
7
Gisborne
New Plymouth
4
Cape Egmont
Napier
Patea
Wanganui
9
8
Palmerston N
Foxton
Castlepoint
10
Wellington
Farewell Spit
Nelson
14
Blenheim
18
Cape Campbell
Cape Foulwind
Westport
11
Greymouth
Hokitika
15
19
Kaikoura
Bealey
Christchurch
Lyttelton
20
Ashburton
21
Okuru
12
16
Mackenzie Country
22
Timaru
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Queenstown
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Clyde
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Dunedin
Port Chalmers
13
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N.Z. MEAN TIME

District.

11. In the northern portion of this district the average was exceeded by about 20 per cent., but elsewhere the total fall was below normal, in a few cases being only half. With the exception of the 30th, no abnormal falls were measured, but on the above day the observer at Ross measured 5·28 in., and at Hokitika 3·84 in. A considerable amount of fair weather was experienced during the month, most of the rain falling during the night-time.

12, 13. Precipitation was generally in excess of the average, the difference ranging from 10 per cent. in the north to 50 per cent. in the southernmost portion. Weather as in district No. 11.

14. Some heavy rain occurred between the 14th and 18th, and several other shorter periods of wet weather were experienced. On the whole, however, fair to fine weather prevailed.

15. Considerably below the normal rainfall was recorded, in most cases only half. The longest period of disturbed weather was from the 25th to the end of the month, and during this period westerly gales and heavy rain were experienced. Fair to fine days were frequent.

16, 17. Fair weather predominated, both the total rainfall and the number of wet days being below the average.

18. The weather was generally mild with more than the usual amount of cloudiness. Rainfall was about the normal, and on several days very strong winds occurred.

19–23. On the whole fair and seasonable weather prevailed, the total rainfall being about normal, but in some cases somewhat below. No particularly heavy falls were recorded.

24, 25. On the 29th and 30th heavy rains were experienced and some of the larger rivers were moderately flooded. During the rest of the month a considerable amount of dull and showery weather prevailed. Rainfall was generally much in excess of the average.

HONEY-CROP PROSPECTS.

THE Director of Orchards, Gardens, and Apiaries Division has received the following reports on the honey-crop prospects from the Apiary Instructors :—

AUCKLAND.—October has been a very broken month with constant showers and rather windy, but the rain is having a beneficial effect on the clovers. During November bees should commence to store honey from the white clover, provided we get warm sunny days. Several exporters are inquiring for honey for export, and there are good prospects of better prices for all grades of honey.—*G. V. Westbrooke.*

WELLINGTON.—A little boisterous weather has recently been experienced throughout the north. This makes it necessary for beekeepers to keep a watch for colonies with depleted stores. The general prospects for a good honey-flow are, however, unchanged. There is little to report *re* prices and market conditions. —*F. A. Jacobsen.*

CHRISTCHURCH.—The land was becoming very parched, but the recent rain has relieved anxiety for the present. Stocks are strong, and many beekeepers are giving extra room by adding additional supers. Nectar is being gathered and stored, mostly from mixed sources. The fields are looking very well, and clover in particular is exceptionally good and is just beginning to come into bloom. Should favourable weather continue there are prospects of an early season. Many hives are making preparation to swarm, and if beekeepers desire an increase, it is a favourable opportunity to form nuclei from such stocks. Section honey is being inquired for by merchants. Extracted honey is selling freely at firm prices. Another consignment of honey will be exported from Canterbury this month.—*L. Bowman.*

DUNEDIN.—The prospects of a good average crop are excellent. A continuation of the fine weather has proved valuable to the beekeepers in Otago and Southland. In the bush districts fair surpluses of honey have been obtained, and beekeepers have found it necessary to extract to relieve congested conditions. In the orchard districts where more attention is being paid to bees, orchardists report that fine weather has enabled the bees to work the blossom with excellent results. Prices are unchanged. Beeswax is in good demand.—*E. A. Earp.*

THE FRUIT CROP.

THE officers of the Orchards, Gardens, and Apiaries Division report as follows on the condition of the fruit crop at the end of October:—

WHANGAREI.—Apples: Heavy to medium. Lemons: Fair. Nectarines and peaches: Heavy; every prospect of a record crop. Pears: Heavy to medium. Plums (English and American): Heavy to good. Plums (Japanese): Light to medium. Strawberries: Fair to good. Tomatoes: Looking fairly well. Oranges: Show well. Loquats: Heavy. The weather-conditions during the blossoming season have been little short of ideal for pollination, and the bees were enabled to carry out their work uninterruptedly. Consequently there is a big setting all round of deciduous fruits, with the exception of some varieties of plums. The latter part of the month has been dry, and peaches and nectarines on the volcanic land, and also strawberries, were feeling the want of a good rain, which is now falling. Peach-curl and pear-scab are much in evidence around the Whangarei district, this probably being due almost entirely to the use by some growers of a new "Bordeaux" powder for winter application, instead of continuing to follow the directions of the Department's leaflet. Codlin-moth is on the wing.—*J. W. Collard.*

AUCKLAND NORTH.—Apples: Fruit setting well; every indication heavy crops. Cherries: Good prospects; setting heavy crop. Lemons: Looking well. Nectarines: Setting well; promise good crop. Peaches: Extra heavy promise. Pears: Very good prospects; block-spot rather prevalent. Plums (English and Japanese): Average crop. Strawberries: Fortunately rain fell at critical period, and the plants are now growing well, with promise of good crop. Glasshouse tomatoes are looking well, outside plants being very vigorous.—*W. C. Thompson.*

AUCKLAND SOUTH.—Ideal weather for orchardists has prevailed this month, and has allowed them to get their work well forward. Apples have set exceedingly well, and all other fruit-trees, heavy-cropped or otherwise, are looking well, and everything points to a heavy growth of wood. Strawberries are again looking well, the warm rains we have had this last month being of great benefit to plants and fruit. Tomatoes still continue to look well; fruit is now forward, and will soon be on the market. Irish blight has up to the present not been noticed to any degree.—*N. R. Pierce.*

HAMILTON.—Apples: Early varieties set well; spraying for moth in full swing; very free from scab so far. Apricots: Very light setting of fruit. Cherries: Fair average crop. Gooseberries: Fruit developing rapidly; an early harvest may be expected. Lemons: In fair supply. Nectarines: Fair crop may be expected. Peaches: Fair average crop may be expected from some districts. Aphis is rather prevalent. Frost last month caused fruit to drop in many localities. Pears: Crops have set very well; a little scab showing. Plums: Looking fair. Plums (Japanese): Crops light generally. Strawberries: Ripening fair where grown. Tomatoes: Plants looking well; no traces of blight so far.—*T. E. Rodda.*

POVERTY BAY.—Apples: Most varieties have set well. Apricots: Considerably below average. Gooseberries: Good. Lemons: Recovering, and showing fair amount of bloom. Nectarines: Good promise. Peaches: Most varieties have set well. Pears: Most have set well. Plums: Medium. Plums (Japanese): Good. Tomatoes: Medium. Walnuts: Have set very well. Although some welcome rains have fallen these will be quite inadequate to pass through the summer unless a further and considerable downfall occurs.—*W. R. L. Williams.*

MANAWATU AND WAIRARAPA.—Apples: Setting well; good crop of all varieties. Apricots: Crop below average owing to severe frost at the beginning of the month. Cherries: Expect heavy crop if weather holds good; much earlier this season. Gooseberries: Good crop in Manawatu; nearly all destroyed by

frost in Wairarapa. Nectarines and peaches: Good average crop; peach-curl is troublesome where winter spraying has been neglected. Black aphis has also caused trouble in some districts. Pears: Good crop; all varieties setting well; black-spot showing up on later varieties. Plums (English and Japanese): Frost on the 4th October destroyed almost all plums in Wairarapa; on the whole, small crop of both varieties; "pocket" or "bladder" plum is in evidence. Tomatoes: Also suffered from the effects of frost; but still good crop is anticipated.—*George Stratford.*

WANGANUI.—Apples: A heavy crop has set. Apricots: Good crops maturing well. Cherries: Prospects above the average. Gooseberries: An excellent crop. Nectarines and peaches: Crop moderate, but of good quality. Pears: Full crops have set; scab giving some trouble. Plums: Crop uneven, but many trees heavily loaded. Plums (Japanese): Good generally. Strawberries: Plantations looking well. Tomatoes: Some very forward crops under glass. The weather is still excellent, with warm steady showers, little wind, and only one frost that has left its mark, and that on lowlands in only a few places. Trees generally are in good foliage, with heavy crop set.—*W. C. Hyde.*

HASTINGS.—Apples: Practically all varieties are bearing heavily. Apricots: Fair crops where not damaged by frost. Cherries: Very good. Gooseberries: Very good; just coming in. Nectarines and peaches: Light crops on the whole; some varieties are bearing very well, whilst others, owing to the frost, in some localities are very poor. Pears: This crop is somewhat uneven—heavy in many orchards and light in others; a fair average crop on the whole may be expected; so far black-spot is far less troublesome than last season. Plums: Fair to heavy crops. Plums (Japanese): Much lighter than usual. Raspberries: Looking very well. Strawberries: Not largely grown; bearing very well; just coming in. Tomatoes: Those under glass are looking well; so far diseases are not so troublesome as last season.—*J. A. Campbell.*

WELLINGTON.—Apples: Setting well. Apricots: Cut with frosts. Cherries: Fair. Gooseberries: Marketing early varieties. Nectarines: Poor. Peaches: Fair. Pears, plums, and Japanese plums: Badly damaged by frost. Raspberries: Fair. Strawberries: Poor. Tomatoes: Bottom fruit setting well indoors; outside just planting.—*T. C. Webb, jun.*

NELSON.—Apples: Setting heavily all through the district; powdery mildew more prevalent than usual; apple-scab making its appearance; red spider also in evidence. Apricots: Have set a heavy crop up to the present; shot-hole fungus slight. Cherries: Have set very well. Gooseberries: A good crop; few being picked. Nectarines and peaches: Varying from medium to heavy; on the whole a good crop may be expected; curl and aphis prevalent. Pears: Have set well; scab bad in places; pear-mite (*Phytoptus pyri*) worse than usual. Plums: Have set fairly well. Plums (Japanese): Good; fair amount of pocket-plum in places. Raspberries: Looking well. Strawberries: Setting good crops of fruit; growers starting to pick. Tomatoes: Few being picked in glasshouses fairly free from fungus diseases; heavy plantings out-of-doors this season. Good rains fell about the middle of the month, doing a vast amount of good to small fruits and tomatoes, but assisting the spread of apple and pear scab, and keeping growers busy with the spray-pump.—*J. H. Thorp.*

BLENHEIM.—Early in the month a slight frost did considerable damage amongst the plums. All other varieties of fruit are setting well. Spraying for mussel scale is now over, and a few have started spraying with arsenate of lead for codlin-moth. Peach-curl is in evidence in different parts of the district; also green aphis.—*B. G. Goodwin.*

NORTH CANTERBURY AND WEST COAST.—Apples: Good crop. Apricots: Light crop; cut badly with late frost. Cherries: Medium. Gooseberries: Good. Nectarines and peaches: Fair crop. Pears: Expect good crop. Plums: Fair crop. Plums (Japanese): Light crop. Raspberries: Good crop. Strawberries: Good crop. Tomatoes: Setting freely under glass; just beginning to plant extensively outside. There is still a fair quantity of local apples, one grower having between three thousand and four thousand cases in his store in Papanui district. These are gradually being put on the local markets. It is pleasing to note that they are holding their own with the American apples, bringing up to 13s. 6d. per case.—*W. J. Courtier.*

CHRISTCHURCH.—Apples: Setting well; considerable red spider on the move. Apricots: A very poor crop; as indicated previously, badly damaged by frost. Cherries: Look well, and promise of a good crop. Gooseberries: Filling out nicely. Nectarines and peaches: Very patchy again; cut by frost this month. Pears: Promising well; black-spot made an appearance. Plums: Promising well. Plums (Japanese): Quite a failure; ruined by frost. Raspberries: Looking well. Tomatoes: Out-of-door planting just commenced; under glass the plants are looking well, and so far I have detected no signs of disease.—*G. Esam.*

TIMARU.—Apples have, with the exception of Rome Beauty, finished blossoming. Powdery mildew is very much in evidence, due primarily to environment and climatic conditions prevailing. That *bête noir* of all fruitgrowers—scab—not yet in evidence. The set to the present may be estimated at 70 per cent. Apricots: Where frost has not been able to affect this fruit good crops have set. The question often asked, "Does protection from frost pay?" is answered right in this instance. A fruitgrower in the Geraldine district threw a piece of hessian or scrim over an apricot with a profusion of bloom, as there was every indication of frost. That tree now stands as a monument to-day covered in fruit, instancing what protection can do. Cherries have set a real good crop estimated at 95 per cent. Gooseberries: Set at about 88 per cent.; gooseberries now on local market. Peaches: Though set well at about 70 per cent., I do not think they will hold up. Curl-leaf and black aphis (*Myzus c.*) are in evidence. Pear-mite (*Phytoptus p.*) is also in evidence. I have advocated as a deterrent kerosene emulsion, 1–15 to 18 ratio. Black and red currants have set a good crop and making rapid growth. Tomatoes under glass have done remarkably well; some growers talk of planting in the open next month. Up to the present there have been no indications of disease in the young plants. The weather-conditions prevailing during October have been of the spring type. The latter portion of the month has been wet and cold.—*A. B. Mansfield.*

DUNEDIN.—Apples: Abundant crops have set. Apricots: Very good. Cherries: Very good. Gooseberries: Very good crop. Currants: Very good crop. Nectarines: Fair crop. Peaches: Very good. Pears: Very good. Plums: Good crop. Plums (Japanese): Fair crop. Raspberries: Fair crop. Strawberries: Very good crop. Tomatoes have been planted extensively both inside and outside, and are looking very well. A frost about the middle of the month cut the early blooms of the strawberries at Alexandra, some growers thus losing their early fruits, but the later blooms have set well and give promise of abundant crops. The first of these fruits are just being sent to market, and as usual command high prices, the first pottle of the season realizing 5s. at Dunedin on the 30th. The same frost also did considerable damage in a few of the apricot orchards, cutting off some well-set fruit; but this was limited to a very small area. A general steady rain fell throughout the district on the 29th, proving very beneficial to the orchards of Central Otago. All fruit has set very well, and heavy crops may be expected. Peach-curl is prevalent in some places. Trouble has again arisen this spring by a considerable number of peach-trees of all ages dying off. This is confined chiefly to the later varieties, the Muir suffering most. I am inclined to think that climatic conditions are mainly responsible for this. It is a noticeable fact that the trees suffering did not ripen their wood and lose their leaves in the natural way last autumn, many of them retaining their foliage all through the pruning season, thus not being in a condition to withstand the hard winters experienced in this district.—*W. T. Goodwin.*

Agricultural Show Dates.—Auckland Agricultural and Pastoral Association, 10th, 11th, 12th, and 13th December, 1913; Te Aroha Agricultural and Pastoral Association, 28th and 29th January, 1914; Marton District Agricultural and Pastoral Association, 11th February, 1914; Dannevirke District Agricultural and Pastoral Association, 11th and 12th February, 1914; Masterton Agricultural and Pastoral Association, 17th and 18th February, 1914.

MARKET CONDITION OF LOCAL FRUIT AND VEGETABLES.

The Fruit Inspectors of the Orchards, Gardens, and Apiaries Division report as follows on the condition of locally grown fruit and vegetables in the shops and auction-rooms, and the market position of these, for the month of October:—

Auckland.—Throughout the past month there have been few consignments of locally grown fruit handled in the Auckland markets. Strawberries are now coming forward in fair quantities, and choicest berries have been realizing from 1s. 3d. to 1s. 6d., and prices have ranged between that and 8d., according to quality. Lemons are bringing from 8s. to 12s. per case. Loquats are small and scrubby, and, as fair quantities of first-class fruits have been arriving from Sydney, the local product has had to be pushed at from 4s. to 5s. per 20 lb. case.—*C. Craigie.*

Wellington.—The strike of waterside workers has practically caused the local markets to come to a standstill in the fruit line. Consignments of fruit and green peas from Nelson were not allowed to land on the wharf, and had to be sent back. Sydney fruit is being landed and sold at other ports; consequently the prices here are high. All vegetables are up in price excepting cabbages and lettuce, which are glutting the markets. Old potatoes have advanced £1 10s. per ton, and are now quoted at £5 per ton. Onions remain firm at £11 10s. per ton. New potatoes are scarce and prices good. Tomatoes (hothouse) are being retailed at 2s. per lb.—*T. C. Webb, jun.*

Christchurch.—The markets are almost bare of local fruits, but produce is offering in plenty and realizing well. A few local apples realized 10s. Tomatoes, the first of the season—about 50 lb.—brought as high as 2s. 7d. per lb. Cucumbers 7d. to 9d. per lb. New potatoes, 2d. per lb.; old potatoes are as low as £1 a ton in paddock.—*G. Esam.*

Dunedin.—At the beginning of the month a few lines of apples and pears from Nelson and Canterbury came to hand in good order. Poor-man oranges, small and of medium quality. Gooseberries and tomatoes in good order, but small supply. The first consignment of strawberries from Central Otago, three-quarters of a pound, came to hand on the 30th and realized 5s. Cucumbers are in good order, but the supply is short. Vegetables are now falling off, and there have been only small supplies of the following: Rhubarb, new potatoes, cabbages, leeks, cauliflowers, radishes, celery, asparagus, artichokes, green peas. Prices for the month ruled as follows: Apples, 9s. to 10s. 6d. per case; pears, 8s. to 9s. per case; Poor-man oranges, 4s. per half-case; strawberries, 5s. per pottle; gooseberries, 4½d. to 6½d. per lb.; tomatoes, 3s. 1d. to 4s. 6d. per lb.; cucumbers, 8s. 6d. to 10s. per dozen, up to 13s. 6d. for extra choice; asparagus, 4s. to 7s. 3d. per dozen bundles; cabbages, 4s. to 4s. 6d. per sack; cauliflowers, 3s. to 6s. 6d. per sack; new potatoes, 1½d. to 2d. per lb.; rhubarb, 1d. to 1½d. per lb.—*E. T. Taylor.*

Bluff.—Very little New-Zealand-grown fruit was on this market during October. There were only a few cases of Nelson and Canterbury apples. Vegetables have been plentiful. No potatoes were exported to New South Wales this month, and there is not much likelihood of any more going this season. The following were the current prices for the month: Apples, 10s. a case; potatoes (table), £2 to £2 10s.; o.t.c.s., £1 5s. to £1 10s.; Up-to-Date seed, £2 10s.; cabbage, 3s. a sack; cauliflower, 3s. 6d. to 4s. a sack; carrots, 4s. to 5s. a sack; parsnips, 4s. 6d. a sack; swedes, 1s. 6d. a sack; rhubarb, 1½d. to 2d. a pound.—*R. Hutton.*

MEAT-TRADE TERMS.

In regard to the meat-trade terms for Canterbury lamb published in the *Journal* of last July, Mr. Crabb, the London Veterinary Officer, advises that the following terms are recognized by the trade in London: "Twos"—a carcase of lamb under 36 lb.; "eights"—a carcase over 36 lb. and under 42 lb.; "fours"—a carcase over 42 lb. and under 50 lb.; and "tegs"—a carcase of 50 lb. This classification is also used by several other freezing-works besides the Canterbury works.

THE DOMINION'S EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.	Sundry.
January,	1913	166,714	229,179	6,886	109,251	63,864	118,986	..	329	..	6,969	2,215	4,110	611 carcases pork.
,,	*1912*	*237,284*	*302,399*	*12,424*	*114,512*	*64,005*	*95,994*	..	..	*7,295*	*6,365*	*1,942*	*3,407*	*59* ,,
February,	1913	326,337	403,698	12,666	89,098	81,733	127,968	..	..	..	12,520	4,295	7,973	64 carcases pork.
,,	*1912*	*208,424*	*273,246*	*13,052*	*101,544*	*62,398*	*106,074*	*607*	..	..	*6,831*	*1,615*	*1,056*	..
March,	1913	86,224	210,166	7,428	47,560	59,844	49,661	..	115	..	12,552	7,662	4,043	250 carcases pork.
,,	*1912*	*324,192*	*518,402*	*20,201*	*64,925*	*49,308*	*70,022*	..	*4,980*	..	*3,832*	*1,352*	*2,644*	*16* ,,
April,	1913	303,937	647,948	16,834	11,358	52,934	61,988	..	300	..	9,049	3,351	3,889	457 carcases pork.
,,	*1912*	*213,178*	*355,829*	*7,046*	*38,986*	*38,137*	*31,615*	*4,905*	*2,180*	..	*5,134*	*1,958*	*4,458*	..
May,	1913	418,221	731,520	22,073	637	46,304	33,281	..	265	2,000	15,751	5,005	9,057	100 carcases pork.
,,	*1912*	*454,506*	*744,287*	*32,691*	*1,441*	*40,535*	*51,833*	*11,157*	*26,569*	*1,500*	*11,963*	*2,826*	*6,287*	..
June,	1913	315,034	528,815	24,444	79	3,166	18,741	..	..	13,072	13,592	4,065	5,439	588 carcases pork.
,,	*1912*	*170,738*	*287,697*	*24,605*	*558*	*7,712*	*18,138*	*9,160*	*7,622*	*2,039*	*5,646*	*1,168*	*1,213*	*221* ,,
July,	1913	215,713	331,353	14,030	..	1,687	17,169	5,651	300	9,190	9,682	1,720	10,793	..
,,	*1912*	*291,097*	*371,474*	*29,457*	*684*	*1,255*	*16,567*	*44,324*	*23,216*	*20,573*	*7,463*	*1,856*	*5,892*	*210 carcases pork.*
August,	1913	161,593	178,263	13,129	8	407	8,494	11,604	45	38,480	3,714	2,310	6,406	6 carcases pork.
,,	*1912*	*207,239*	*157,589*	*10,478*	*559*	..	*10,409*	*42,580*	*38,802*	*19,562*	*3,758*	*523*	*4,219*	..
September,	1913	133,122	83,521	5,334	6,575	2,020	7,176	..	..	16,336	3,826	1,501	10,049	16 carcases pork.
,,	*1912*	*44,657*	*40,759*	*1,174*	*8,723*	*1,204*	*6,671*	*15,742*	*17,363*	*19,933*	*2,957*	*501*	*3,671*	..
October,	1913	14,122	25,735	580	42,847	21,452	2,705	..	..	10,020	6,986	3,672	2,923	..
,,	*1912*	*51,263*	*15,393*	*3,882*	*49,962*	*16,389*	*4,647*	*7,952*	*64,480*	*5,396*	*4,193*	*401*	*9,075*	..
November,	1912	54,175	8,286	282	140,751	57,181	33,305	3,680	40,896	13,892	9,866	1,911	5,466	..
,,	*1911*	*47,770*	*10,427*	*403*	*135,741*	*57,319*	*44,934*	*15,833*	..	*16,606*	*7,844*	*2,183*	*3,085*	..
December,	1912	117,740	106,310	4,774	119,885	66,213	44,789	5,868	30,490	10,070	3,816	2,613	3,686	..
,,	*1911*	*72,192*	*91,965*	*765*	*109,397*	*46,883*	*54,297*	..	..	*4,366*	*5,719*	*1,364*	*2,708*	..

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE THREE MONTHS ENDED 31ST OCTOBER, 1913.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. Hinds.	Beef. Fores.	Butter. New Zealand.	Butter. Danish.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila.	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila.	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
1913.							d.	d.	d.	d.	d.	d.															
Aug. 2	..	..	..	..	..	..	4¼	4⅛	5⅜	5¼	4	$3\frac{1}{16}$	..	..	66/0	66/0	66/0	30/10/0	26/10/0	31/0/0	30/10/0	26/0/0	31/10/0	..	..	..	..
" 9	..	..	..	..	..	..	4¼	4⅛	$5\frac{9}{16}$	5⅛	4	3	..	..	67/0	66/0	..	31/10/0	27/10/0	31/10/0	32/0/0	28/0/0	31/10/0	..	..	..	..
" 16	..	..	..	..	..	..	$4\frac{3}{16}$	4⅛	5½	5⅛	..	..	..	..	67/0	66/0	66/0	32/0/0	28/0/0	31/10/0	32/0/0	28/0/0	32/0/0	..	..	..	..
" 23	1/3½	1/3¾	1/4½	1/7¾	1/10½	2/4½	..	..	5½	5⅛	..	..	..	..	..	..	..	31/0/0	27/0/0	31/0/0	31/5/0	27/5/0	30/10/0	..	..	..	..
" 30	..	..	..	..	..	2/3¾	$4\frac{3}{16}$	$4\frac{3}{16}$	$5\frac{9}{16}$	5⅛	4⅛	3	..	..	..	..	..	30/0/0	26/10/0	31/10/0	30/15/0	26/15/0	30/10/0	..	..	..	..
Sept. 6	..	..	..	..	..	..	4⅜	4¼	5⅜	5¼	..	..	126/0	..	68/0	..	67/0	30/10/0	26/0/0	31/0/0	31/0/0	26/10/0	30/10/0	37/0	38/6	..	..
" 13	..	..	..	..	..	..	4½	4⅜	$5\frac{11}{16}$	5⅜	$4\frac{3}{16}$	3	..	130/6	68/0	..	66/6	30/0/0	25/10/0	31/0/0	30/0/0	25/5/0	30/5/0	..	..	..	..
" 20	1/3½	1/3¾	1/4½	1/7½	/10½	2/3¾	4⅜	4⅛	..	..	4¼	3⅛	..	..	..	..	..	29/10/0	25/5/0	30/0/0	29/10/0	25/5/0	29/10/0	..	..	..	..
" 27	..	..	..	..	..	..	..	..	..	5¼	4⅛	3	..	..	..	..	..	30/0/0	26/0/0	30/10/0	30/0/0	26/0/0	30/0/0	..	36/0	..	..
Oct. 4	..	..	..	..	..	..	4⅜	$4\frac{7}{16}$	5⅜	$5\frac{9}{16}$	4¾	..	..	..	..	..	..	29/15/0	25/15/0	30/0/0	29/15/0	..	30/0/0	..	..	..	..
11	..	..	..	..	..	..	..	..	$5\frac{9}{16}$	$5\frac{1}{16}$	4⅛	3¼	..	..	..	..	..	..	..	30/0/0	29/15/0	25/15/0	29/10/0	..	36/0	23/0	20/6
18	..	..	..	..	..	2/4	4⅜	4⅜	$5\frac{9}{16}$	$5\frac{9}{16}$	4½	3⅜	..	134/6	..	..	65/6	29/0/0	25/15/0	30/10/0	29/10/0	26/0/0	30/0/0	..	..	..	..
" 25	..	..	..	..	..	..	..	..	5⅛	5⅛	4⅜	$3\frac{5}{16}$	..	131/6	..	..	..	29/5/0	25/15/0	30/10/0	29/5/0	25/15/0	30/10/0	..	..	..	..

HEMP AND TOW GRADING RETURNS.

OCTOBER.

Hemp.—The total number of bales graded was 13,447, as compared with 8,871 for the corresponding month of last year, an increase of 4,576 bales. For the twelve months ending 31st October, 1913, the number of bales graded was 164,981, as compared with 93,880 for the previous twelve months, the increase being 71,101 bales.

Tow.—During the month 4,368 bales were dealt with, as compared with 3,083 for the corresponding month of last year, an increase of 1,285 bales. For the twelve months ending 31st October, 1913, the number of bales graded was 57,693, as compared with 27,284 for the previous twelve months, an increase of 30,409 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF OCTOBER, 1913.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Con-demned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	394	988	793	140	5	20	2,340
Napier ..	..	..	220	..	..	..	..	..	220
Foxton ..	..	..	954	2,431	740	151	33	..	4,309
Wellington ..	..	35	1,867	1,741	717	48	10	..	4,418
Blenheim ..	..	..	118	..	..	..	..	..	118
Picton ..	..	..	51	3	..	..	..	..	54
Lyttelton ..	..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	224	98	64	3	..	..	389
Bluff	..	..	340	722	403	134	..	..	1,599
Totals ..	..	35	4,168	5,983	2,717	476	48	20	13,447
Percentages of totals	..	0·26	30·99	44·49	20·21	3·54	0·36	0·15	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	349	528	51	928
Napier	..	38	6	..	44
Foxton ..	221	794	211	..	1,226
Wellington ..	149	498	601	31	1,279
Blenheim ..	42	..	8	..	50
Picton	..	3	..	..	5
Lyttelton ..	..	..	..	..	..
Dunedin ..	..	27	106	3	136
Bluff	..	231	362	107	700
Totals ..	412	1,942	1,822	192	4,368

Stripper-slips.—Passed for export: Foxton, 248; Wellington, 270—total, 518. Condemned: Foxton, 17; Wellington, 5—total, 22.

NEW ZEALAND-SAN FRANCISCO TRADE.

THE following are the shipments of produce for San Francisco, Rarotonga, and Tahiti, and transhipments for Vancouver from New Zealand, since June last:—

—	"Aorangi," 20th June.	"Tahiti," 18th July.	"Moana," 15th August.	"Willochra," 13th Sept.	"Tahiti," 10th Oct.
Gum, packages	45	6	34	..	21
Seeds, sacks	800	450	23	120	365
Grain, &c., sacks	59	75	72	28	76
Meat, cases	154	152	205	60	950
Onions, cases	13	5	10	2	..
Potatoes, sacks	24	9	15	3	9
Sundries, packages ..	122	370	157	422	247
Butter, boxes	4	792	7	545	4,415
Hemp, bales	262	371	391	377	..
Frozen lamb, carcases ..	2	2	2	2	2
" mutton, " ..	..	30	54	..	..
" veal, " ..	..	..	..	..	..
" beef, quarters ..	..	32	..	..	..
" sundries, packages ..	..	5	5	7	..
Timber, pieces	1,151	..	..	..	136

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since June last:—

—	"Marama," 6th June.	"Makura," 5th July.	"Niagara," 2nd August.	"Marama," 30th August.	"Makura," 27th Sept.	"Niagara," 25th Oct.
Butter, boxes ..	1,210	4,401	720	1,753	10,062	18,335
Mutton, carcases	50	65	1,014	1,500	1,119	1,189
Beef, quarters ..	2,271	3,520	7,195	4,217	955	259
Veal, carcases ..	..	..	..	74	171	291
Frozen sundries, packages	90	471	42	..	2,202	12
Wool, bales ..	351	835	..	103	207	320
Grass-seeds, beans, &c., sacks	..	75	..	38	9	..
Hides and skins, sacks, &c.	1,675	748	200	1,468	3,533	4,144
Onions, cases ..	..	..	..	..	..	..
Sheep-skins, bales	..	522	..	..	..	146
Jam, cases ..	75	20	1	53	..	74
Sundries, packages	103	189	..	1,406	2,586	1,018
Potatoes, crates	..	..	..	..	..	..
Kauri-gum, packages	44	..	..	..	180	267
Hemp, bales ..	167	97	930	116	284	380
Rabbits, crates..	500	15	100	500	..	100
Timber, pieces ..	..	..	..	..	2,819	2,709
Eggs, cases ..	..	..	..	..	..	336
Meats (canned, &c.), cases	..	..	..	..	..	60
Fertilizers, sacks	..	..	..	..	..	914

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of October:—

Port of Shipment.	Horses.				Cattle.			Sheep.			Pigs.		Dogs.	
	To Australia.	To Pacific Islands.	To Vancouver.	To India.	To Australia.	To Pacific Islands.	To South America.	To Australia.	To Pacific Islands.	To Montevideo.	To Australia.	To Pacific Islands.	To Australia.	To Vancouver.
Auckland ..	3	5	4	..	..	16	..	..	204	..	..	42	1	9
Wellington	3	..	..	..	1	..	..	..	..	50	..	..	2	..
Lyttelton ..	2	..	..	..	..	..	..	336	..	..	..	..	..	..
Dunedin ..	..	..	..	..	..	..	..	..	..	100	..	..	7	..
Invercargill	1	..	..	..	..	..	..	..	..	..	..	..	1	..
Totals ..	9	5	4	..	1	16	..	336	204	150	..	42	11	9

Auckland also exported 16 crates of poultry to the Pacific islands.

The following are the particulars of horses exported: Thoroughbreds—1 stallion, 3 mares, 2 geldings; harness—3 mares, 1 gelding; ponies—5 mares, 1 gelding; trotting—1 stallion, 1 mare.

The following are particulars of sheep exported: Romney Marsh—80 rams, 50 ewes; Corriedale—31 rams, 145 ewes; English Leicester—130 rams, 50 ewes; miscellaneous—204.

PRODUCE IMPORTED.

THE following return, compiled by the Customs Department, shows the total importations into New Zealand during the month of October, 1913, of agricultural and farm products:—

Item.	Quantity.	Value in £
Bran	..	..
Butter	..	..
Cheese	5 cwt.	38
Chaff	281 tons	1,353
Fruits, fresh; all kinds	2,409,407 lb.	27,546
Barley	..	..
Oats	..	..
Wheat	..	..
Onions	7,380 cwt.	3,600
Pollard and sharps	..	..
Potatoes	..	2
Seeds, grass and clover	523 cwt.	1,260
Total value imported ..	..	£33,799

STOCK IN QUARANTINE.

The following stock were received into quarantine during the month of October:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			Motuihi Island (Auckland).		
5	Circus horses ..	Mixed	Eastern Pacific	M. McMahon ..	Auckland.
1	Greyhound ..	Male ..	Ditto ..	,, ..	,,
1	Performing pig ..	Female	,, ..	,, ..	,,
2	Circus horses ..	,,	,, ..	W. J. Baker ..	,,
1	Circus horse ..	Male ..	,, ..	,, ..	,,
1	Donkey	,,	,, ..	,, ..	,,
			Somes Island (Wellington).		
3	Southdown rams ..	Male ..	London ..	A. H. Russell ..	Hastings.
2	Berkshire pigs ..	,, ..	Sydney ..	J. G. Cobbe ..	Feilding.
1	Roan Shorthorn bull	,, ..	Melbourne	A. Williams ..	Te Aute.
1	Ditto	,, ..	,,	Sir W. Buchanan ..	Tupurupuru.
2	Black and white collies	,, ..	Liverpool	G. Cail (New Zealand Express Co., agents)	Wellington.
1	Shorthorn bull ..	,, ..	Melbourne	R. D. McLean ..	Hawke's Bay.
1	Shorthorn cow ..	Female	,,	,, ..	,,
1	Shorthorn calf ..	Male ..	,,	,, ..	,,
1	Ayrshire bull ..	,, ..	,,	David Buchanan ..	Palmerston North.
1	Southdown ram ..	,, ..	London ..	G. P. Donnelly ..	Hawke's Bay.
4	Southdown ram lambs	,, ..	,, ..	,, ..	,,
2	Southdown ewes ..	Female	,, ..	,, ..	,,
10	Southdown ewe lambs	,,	,, ..	,, ..	,,
1	Romney ram ..	Male ..	,, ..	A. Mathews ..	Featherston.
1	Romney ewe ..	Female	,, ..	,, ..	,,
1	Lincoln ram ..	Male ..	,, ..	W. Perry ..	Masterton.
1	Lincoln ewe ..	Female	,, ..	,, ..	,,
1	Ryeland ram ..	Male ..	,, ..	B. Chambers ..	Mangatoi, Mokau.
1	Clumber spaniel ..	,, ..	,, ..	C. A. Whitney ..	Auckland.
			Quail Island (Lyttelton).		
1	Ayrshire bull ..	Male ..	London ..	Wright, Stephenson, and Co.	Dunedin.
7	Ayrshire heifers ..	Female	,, ..	Ditto	,,
3	Romney rams ..	Male ..	,, ..	,, ...	,,
2	Lincoln rams ..	,, ..	,, ..	National Mortgage Company	,,
5	Southdown rams ..	,, ..	,, ..	J. B. Reid ..	Elderslie.
32	Southdown ewes ..	Female	,, ..	,, ..	,,
1	Jersey bull ..	Male ..	Melbourne	H. E. B. Watson ..	Tai Tapu.

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THE NEW ZEALAND LINCOLN AT HOME.

The

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THE LINCOLN.

THE GREAT BRITISH LONGWOOL SHEEP IN NEW ZEALAND.

W. Archibald.

AMONG all breeds of British sheep the Lincoln stands alone as the producer of the heaviest fleece of wool, and therefore the most valuable fibre-producing animal. It is also regarded as the producer of a good mutton carcase, while for cross-breeding purposes, where the objective is a general-purpose sheep, there is, in my opinion, no breed to take its place on the right class of country. The wool of the Lincoln to-day has never been of a more valuable quality. What it loses in comparison with some other breeds in point of fineness it more than makes up in weight and lustre, and provides that quality of increasing importance in the manufacturing world—length of staple—a character which is no doubt responsible for the increasing interest being taken in the breed at the present time.

In short, Lincoln wool has no rival; and this alone is an assurance that the breed will always occupy a prominent position among heavy-wool-producing sheep. As to the Lincoln carcase, we have only to refer to the results at the leading fat-stock exhibition (Smithfield) in the most important mutton-consuming country of the world (England) to learn the great estimation in which it is held for its mutton qualities, as during the final twenty years of the last century the blue ribbon at Smithfield, the open championship of the show, was more often gained by the Lincoln than by any other breed—in fact, I will go further and say a combination of breeds. The New Zealand farmer need not be reminded of the value of the Lincoln for cross-breeding, as he well knows the important part the Lincoln-Merino cross is playing in the South Island, and the still more important part it has played in the evolution of the Corriedale. In the North Island the Lincoln for many years dominated the work of building up the crossbred flocks, and has done more to create the rural wealth of the Island than any other factor.

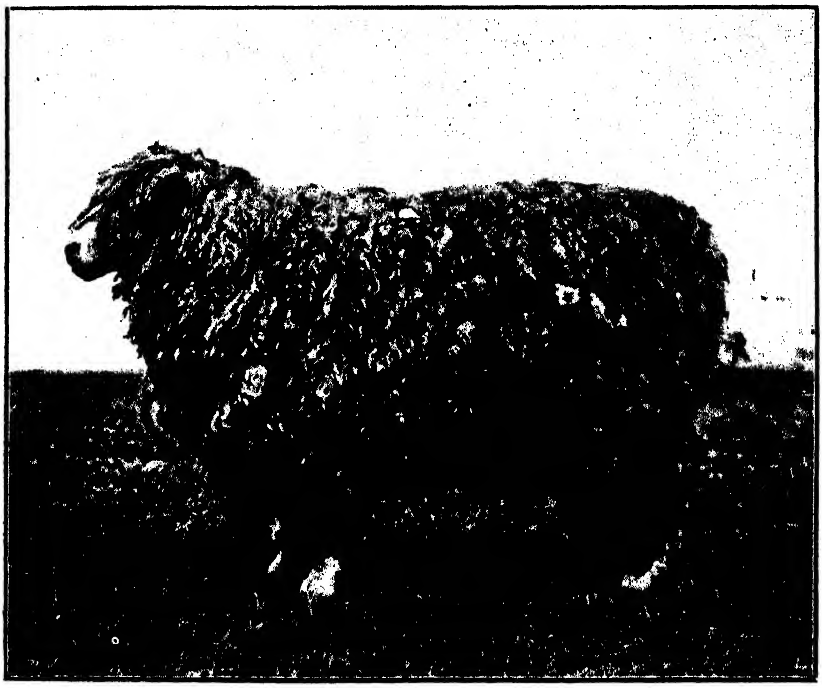
TYPES COMPARED.

Although the Home type has altered considerably from that of the Vessey and Kirkham sheep, which provided the foundation blood of our flocks and which set the New Zealand ideal of type, the "improvements" effected do not appeal to the breeders of this country, who still regard the foundation types referred to as the models to aim at. Notwithstanding that the Home breeders with their present-day style of Lincoln have established a great and lucrative trade with the Argentine, having often obtained sensational values for individual animals, I contend that the truer type of Lincoln we have perpetuated is a more suitable sheep for our requirements. The Vessey and Kirkham types, examples of which are still in evidence in several New Zealand flocks, were on shorter legs, carrying a better covering of wool, had more taking and better-covered heads with the distinct dark markings, in strong contrast to the white noses and pink ears characteristic of the present Home type. The modern Home type has certainly not improved in character; it lacks not only in body and lustre of wool, but has not the evenness of the original type favoured in this country.

THE POINTS OF A LINCOLN.

The most essential characters in the build of a Lincoln are those indicative of constitution, for there is no sheep on which there is such a heavy drain, by reason of the exceptional weight of fleece it has to produce and carry. No breed suffers more from any want

of constitutional vigour than the Lincoln, and failure to appreciate this fact, combined with the attempt to raise the Lincoln on poor and unsuitable country, have been the main reasons why the breed has declined in favour in some localities. In describing the Lincoln frame one need outline only what should be the formation of any well-made sheep. Take the head: this should be the mirror of the animal, and it should absolutely identify the sex. It should have a square muzzle, wide dark nostril, prominent eye, the ear



A Wybourne Champion Ram.

nicely set in, the whole face covered with soft white hair, and the head be on a comparatively short, muscular neck. The expression of the face is a good indication of the character of the animal. When the face is covered with soft white hair it is a good indication of health; and while a long neck is objectionable, too short a neck is equally bad, just as it is obviously a defect in any animal. The first thing to look for in the frame is that it has deep, well-sprung ribs, a wide loin, and a good hind quarter. The frame should be well balanced over both fore and hind legs, and when the sheep moves it should walk with a straight solid step. Both the top and

bottom lines should be level, and it will be found that a poor under line is seldom accompanied by a good top one.

The fleece of the Lincoln is absolutely distinct. It should be as even as a book-leaf from the shoulder to the tail, and from the top of the back to the bottom of the belly, opening freely to the hand, with a defined wave from the skin to the tip. Upon no account should straight hair extend from the tip, which should terminate like a cat's paw.

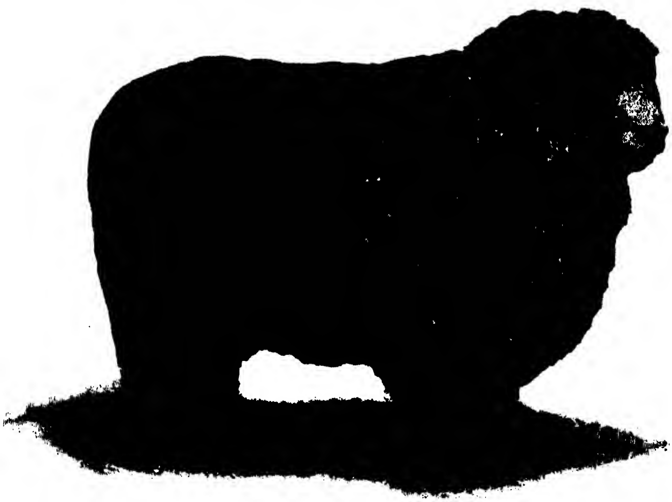
MATING.

This is one of the most interesting and at the same time one of the most important studies in live-stock breeding. It is the

A STUDY OF THE HOME TYPE.

endeavour of every successful breeder so to mate his breeding animals that the most desirable characters may be strengthened and the weak ones counteracted. In this work it must ever be borne in mind that two extremes will never make a happy medium. Even after a lifelong study of the problem it is strange what disappointments come to the breeder when, in his own estimation, he mates male and female ideals, coming, too, from perfect parents, and finds that the progeny is often distinctly inferior. Indeed, I have come to the conclusion that in breeding, as in all other matters, there is a certain element of luck. It is too often the case that many of the lambs promiscuously got are nearer the ideal

type than those in connection with the mating of which we have taken so much pains. An important matter in breeding, given the securing of an ideal type, is a knowledge of the parentage of the sire and dam. I would not suggest that breeders should give up selection. It is a most interesting study. One of the oldest and most respected breeders of the Scotch native sheep, with whose methods I was acquainted in my young days, never made any selection at all, but simply turned out his rams to his ewes. Yet no man could select an animal in the lamb stage better than he could. He had decidedly one of the finest black-faced flocks in Scotland in the "seventies." Of course, in saying this it is not



A PENROSE CHAMPION, BRED BY MR. W. PERRY.

implied that anything should be bred from. The rams must be pure and good, and the ewes must be pure and good—indeed, as near the ideal in every case as possible. But what I would emphasize is that the breeder will probably be as successful in this system as in that of detailed selection, in support of which I give the foregoing case as a fitting illustration. The thing always to be remembered is that to get the best the best must be bred from. Two great factors in developing the finest types of any particular breed are in breeding it only on suitable country and in feeding it in the most judicious manner. A good deal of the breeding undoubtedly goes down the mouth. No man has ever become a successful breeder who has stinted his stock in the matter of feeding. The farmer breeding a certain type of sheep will be well advised

to select his rams and even his ewes from the stock of breeders who are working on country similar to his own, and who have been successful with the breed on that country."

Management of the Breed.

In breeding and rearing the Lincoln the general rules governing sheep-breeding apply—that is, to wean on to succulent food at about four or five months old. My practice is to shear and dip the lambs at weaning, as I find in a wet winter they thrive better when they have less weight to carry. If there be sufficient food in the pasture I prefer wintering without the assistance of roots and hay. An important factor is to give the young animal every assistance to develop well in the first year of its existence. While the females are reared as much as possible on the natural pasture, the rams, both young and old, receive a little assistance in the shape of roots and hay, especially in the event of a harsh winter. For about six weeks after the rams are taken away I approve of running the ewes on poor hilly country, where this is possible. Generally, I keep the ewes on fairly bare feed until after lambing, when I separate the doubles from the singles, giving the former the better feed. All the ewes at this time receive the best treatment. I have adopted the Home system of raddling rams on an extended scale. After the first three weeks the rams are raddled eight times during the following seventeen days with a mixture of castor-oil and hæmatite, the former keeping the colouring-matter moist and therefore effective for a considerable time. This system of marking enables the early-lambing ewes to be separated into different lambing-period sections, if desired.

In my experience of the Lincoln, extending now over twenty years, I find that, given the first twelve months of the sheep's life safely passed, he will come through a hard season equal to, if not better than, the Border Leicester. It is significant in the revival of interest in the breed that those who are establishing flocks or using Lincoln rams in their crossbred flocks are generally men who had former experience of the breed, and therefore appreciate its value.

A pair of stockings presented to Field-Marshal Keith towards the end of the eighteenth century were knitted of thread spun to such fineness that twenty-four miles of it came from a pound of wool.—*The Hosiery Trade Journal.*

SORREL AND SOIL-COMPOSITION.

THE EFFECT OF MANURING.

B. C. Aston, F.I.C.

Complaints are very general this season with regard to the excessive growth of sorrel on cultivated land, and several requests for something which will cause it to die out have been received.

As regards the influence of the composition of the soil on the growth of sorrel, we must turn to the Rothamsted experiments for authoritative and convincing information. Mr. A. D. Hall, the director, thus describes these experiments :—

"The experiments upon grass at Rothamsted began in 1856, about 7 acres of the park close to the house being set aside for the purpose. The land has been in grass as long as any recorded history of it exists—for some centuries at least. It is not known that seed has ever been sown, and at the beginning of the experiments the herbage on all the plots was apparently uniform. The soil is the same stiff reddish loam as is found in the other fields, though, owing to the length of time the land has been in grass, stones are not abundant near the surface.

"The plots, of which there are twenty in all, vary somewhat in size between one-half and one-eighth of an acre. Up to 1874, inclusive, the grass was only cut once, the aftermath being fed off by sheep. Since that time there has been no grazing, and the plots are generally cut twice in the year. The grass is made into hay in the usual way, and the whole produce of each plot is then weighed. On some occasions, however, with the second crop, continuous wet weather has rendered it necessary to weigh the produce in a wet condition, and calculate its equivalent in hay from the amount of dry matter in the material as weighed. On most of the plots the manuring has been continued without change from the beginning of the experiments; the cases in which a change has been made serve to show how rapidly the character of the herbage will respond to alterations in the manure.

"Table LVI shows the amount and nature of the manures applied each year to the plots."

Table LVI.—Manuring of the Permanent Grass Plots per Acre per Annum, 1856 and since.

Plot.	Abbreviated Description of Manures.	Nitrogenous Manures.		Mineral Manures.			
		Ammonium Salts.	Nitrate of Soda.	Superphosphate.	Sulphate of Potash.	Sulphate of Soda.	Sulphate of Magnesia.
		lb.	lb.	Cwt.	lb.	lb.	lb.
3	Unmanured every year ..	..	..	..	..	..	..
4–1	Superphosphate of lime ..	..	..	3·5	..	..	..
8	Mineral manure without potash	..	..	3·5	..	250	100
7	Complete mineral manure ..	..	..	3·5	500	100	100
6	As plot 7; ammonium salts alone first thirteen years	..	..	3·5	500	100	100
15	As plot 7; nitrate of soda alone first eighteen years	..	..	3·5	500	100	100
5	Ammonium salts alone (to 1897)	400	..	..	..	..	..
17	Nitrate of soda alone ..	..	275	..	..	..	..
4–2	Superphosphate and ammonium salts	400	..	3·5	..	..	..
9	Complete mineral manure and ammonium salts	400	..	3·5	500	100	100
11–1	Complete mineral manure and ammonium salts	600	..	3·5	500	100	100
14	Complete mineral manure and nitrate of soda	..	550	3·5	500	100	100

Table LXII.—Rothamsted Park Hay.—Percentage of Sorrel by Weight in the Mixed Herbage from Twelve Selected Plots (First Crops). Five Separations, 1862, 1867, 1872, 1877, and 1903.

(The maximum attained by *Rumex acetosa* (Sorrel) in the particular year is printed in heavier type.)

Year.	Plot 3.	Plot 4(1).	Plot 8.	Plot 7.	Plot 6.	Plot 15.
1862	1·40	3·94	1·93	2·10	12·11	6·64
1867	1·76	5·47	7·86	8·88	**24·27**	7·34
1872	1·77	2·81	1·96	1·16	**7·51**	2·06
1877	1·87	3·37	5·84	6·67	**7·66**	5·79
1903	2·21	1·51	1·91	3·71	5·24	1·56

Year.	Plot 5.	Plot 17.	Plot 4(2).	Plot 9.	Plot 11(1).	Plot 14.
1862	9·15	3·57	**13·89**	5·40	7·02	6·88
1867	15·94	7·53	8·42	10·89	3·96	1·11
1872	7·13	1·58	6·85	4·60	1·09	0·61
1877	2·13	2·56	3·09	3·60	2·25	4·40
1903	**14·84**	1·80	0·54	2·79	0·13	0·57

In explanation it may be said that nitrate of soda gives rise to an alkaline residue (soda) in the soil, and sulphate of ammonia

to an acid residue (sulphuric acid). The contrast between the sorrel-content of the herbage on plots 6 and 15 is striking. Concerning plot 5, Mr. Hall remarks that "the continued use of large applications of ammonium salts has also had an injurious effect upon the reaction of the soil, since it behaves as an acid, and continually removes carbonate of lime. The creeping surface vegetation tends to accumulate, and decays into a substance resembling peat; at the same time the vegetation shrinks into tufts, between which are bare patches of black soil, showing an acid reaction of litmus paper. So pronounced had this effect become on plot 5, which received the larger amount of ammonium salts, that the application has been discontinued since 1897 lest the turf should be entirely killed. Another sign of the sourness caused by the use of ammonium salts without minerals is seen in the prevalence of sorrel on this plot—it forms nearly 15 per cent. of the whole herbage; and it is interesting to note that the only portion of the plot from which the sorrel is absent is a strip that was dressed with chalk in 1883 and 1887."

There are, of course, other factors concerned in the spread of sorrel, the appearance of which cannot be explained entirely in terms of soil acidity and alkalinity, but it is very evident from these figures that excessive acidity is favourable to sorrel-growth. Liming the land is therefore indicated as one of the steps necessary to diminish the growth of sorrel. It may act in two ways—firstly by stimulating the clovers, which will tend to crowd the sorrel out; and secondly by rendering the composition of the soil less suitable for the growth of sorrel. Mr. F. M. Bailey, writing on the weeds of Queensland, states that where possible a dressing of lime should be given to reduce or destroy sorrel.

A Waikato correspondent sends the observation that sorrel does not seem to grow so thickly where ½ cwt. of salt was used on turnips. The use of salt in larger quantities—up to, say, 3 cwt. per acre—as a top-dressing is therefore worthy of an experiment. Salt will no doubt have an alkaline effect on the soil.

Sorrel-seeds are distributed to a great extent by farm animals. That they germinate freely after passing through the digestive tract of the animal was proved by E. Korsmo (Tidssk Norske Landbr. 18 (1911, No. 5, pp. 223–230), who states that in original experiments in feeding weed-seeds to a horse, a cow, and a hog the percentages of viable seeds of different kinds of weeds that were found in the fæces were as follows: Sorrel (*Rumex acetosella*), 26·4, 70·6, and 5 per cent. respectively for the horse, cow, and hog; fat-hen (*Chenopodium album*), 2·5, 16·3, and 20·4 per cent.; chamomile (*Matricaria inodora*), 10·4, 24·0, and 0·02 per cent.; *Rumex domes-*

ticus, 23·0, 90·4, and 11·3 per cent.; bird-rape (*Brassica campestris*), 5·1 and 2·2 per cent. for horse and cow respectively; stinkweed (*Thlaspi arvense*), 37 per cent., and wild mustard (*Sinapis arvensis*), 5·4 per cent., for the horse; and ox-eye daisy (*Chrysanthemum leucanthemum*), 7·5 per cent. for the cow.

These figures leave no room for doubt that the seeds of the *Rumex* family (including sorrels and docks) are admirably fitted to resist changes which may be fatal to other seeds.

It is also probable that under favourable conditions sorrel-seeds may remain dormant in the soil for a considerable period. One or two cultivations may therefore by exposing fresh seed only result in a further crop of sorrel.

The methods of coping with sorrel when it appears will therefore group themselves under the following headings:—

(1.) Continuous cultivation.

(2.) Dressings with fertilizers which are alkaline or become alkaline in the soil.

(3.) Stimulating the growth of leguminous plants (clovers, &c.) which will choke the sorrel.

Whether it will be found possible to prevent the introduction of sorrel-seeds by exercising some care in the treatment or selection of stock, which are to a large extent carriers of sorrel-seeds, is a matter which might be investigated.

DRY SPRAYING.

E. CLIFTON.

So far as field operations are concerned, dry spraying must be pronounced a failure. This applies chiefly to the spraying of potatoes. Dust-spraying can be applied only when every climatic condition is favourable, otherwise it is difficult to obtain the adherence of the spray to the foliage. It is accepted as necessary that each side of the leaf should receive a dressing, whether it be with the usual spray or with the dust. For this purpose an implement is generally used to disturb the whole plant while spraying is in progress. Dust, however, usually fails to affect both the upper and the lower sides of the leaf. Dust-spraying may be useful on small plots, where, if failure results, the cost of reapplication is not serious. But with the larger field operations it will appeal to the farmer that spraying, which is costly, should be of a nature to secure the most effective result, such as is obtained with the usual Bordeaux mixture.

FROM BUSH TO FARM.

FELLING, BURNING, AND GRASSING OF BUSH COUNTRY.

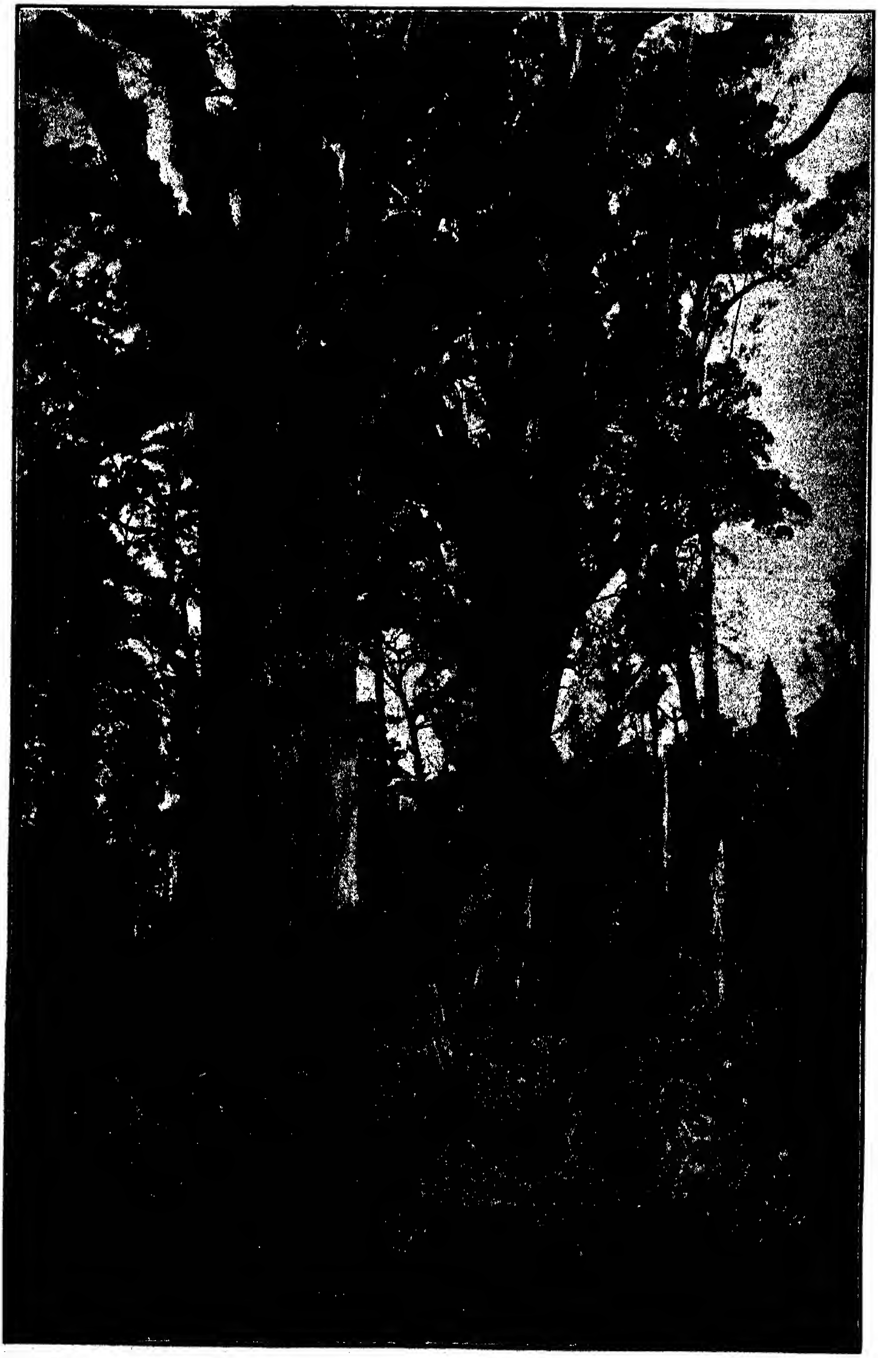
P. Barry.

To the inexperienced an area of heavily timbered bush country, thickly carpeted with underscrub and twined with supplejack, appears a very uninviting prospect from a farmer's point of view. A statement that such country can be made highly profitable and revenue-producing appears but a figment of the imagination, but with a few years of strenuous and properly applied labour the wilderness can be made to blossom like the rose. Where once rimu, tawa, matai, and other varieties of forest-trees raised their heads the useful sheep wanders and produces mutton and wool of a certain value in the markets of the world.

By what process can the virgin bush be transformed into the sheep-farm? To answer this question it is necessary to follow the history of the bush area through a series of operations which may be roughly epitomized under the three main headings of felling, burning, and grassing.

Felling.

It is customary to let felling by contract, and for this purpose it is advisable for the owner to draw up specifications setting out in detail the required work and stressing the method by which it should be done. The work should be commenced in the month of June, or early in July, and one man should be employed for every 30 or 35 acres of bush to be felled. The land should first be thoroughly underscrubbed, by which is meant the cutting of all undergrowth to a height of not more than 6 in. from the level of the ground. It is advisable to have underscrubbing done well in advance of actual felling, because this course facilitates supervision of the contract and will guarantee a rapid and thorough burn when the time arrives. As to felling, there is a conflict of opinion among experienced men as to the advisability of felling trees of large dimensions. Some entertain the idea that it is better to fell all the timber irrespective of size or denomination, while others hold that it is useless to cut trees when over 3 ft. in diameter, since they do not readily burn on account of their great



Typical Mixed Forest.

size, and since they cover horizontally a much greater area than when standing. Again, matai is very slow to burn, and on this account some people leave standing all specimens of this variety of over 18 in. in diameter. A good proportion of the forest country being converted into grass land is being lumbered by sawmilling companies. The common procedure is for the company to do this work in a way best suited to its own requirements and without any regard to the most successful subsequent grassing, which is of more importance to the farmer than the royalties received from the natural covering. The obvious result is that in many cases areas cannot be grassed for several years after the milling-timber has been removed, owing to isolated blocks being left untouched, while leaving the milled portion for several seasons before clearing and grassing prevents the best seeding conditions being secured. The farmer should stipulate that the lumbering should be carried out in a manner that will facilitate rather than retard the important work of laying the best foundation for his permanent pastures, even if this necessitates the acceptance of a lower royalty.

Burning.

When all timber has been lying over a period of not less than seven weeks, burning may be undertaken. It is difficult to lay down any hard-and-fast rules for burning, because the main factor in securing a good burn is the weather-conditions. However, it may be stated that late in December or early in January is the best time to commence burning. This date is chosen for a dual reason—first because usually the weather-conditions are fairly settled at this time of the year, and, secondly, when the burn has cooled, turnips, rape, and mustard can be sown early enough to develop and be able to stock early in the year. Bush should not be fired for at least seven or eight days after heavy rain. A good and effective test as to whether the bush is dry enough is to take a handful of leaves from under a tree and see if they are dry underneath. When they are in this condition it may be presumed that the fall is in good order for burning. A fairly strong wind is a decided advantage when burning, but it is not advisable to light fires while a howling gale is prevailing, because the fire travels too quickly, with the result that a lot of timber which would be consumed by a slow fire is only charred. Fires should always be lit about midday on a warm sunny day.

To light the burn three or four men should be employed at once. They should light the fall at equidistant intervals along the windward side. Under ordinary conditions the timber should be well alight in fifteen or twenty minutes.

Sowing Grass-seed after the Burn.

G. E. Wildbore, photo.

SEEDING.

As soon as the burnt area has sufficiently cooled, seeding may be proceeded with. The choice of varieties of seed to be used is governed in every instance by the formation of the soil and the prevailing climatic conditions. A sufficient quantity of seed would be represented by a mixture weighing about 30 lb. per acre. This may be called heavy seeding, but it is false economy to skimp seed or sow seed which is of poor quality, because either course makes only for the production of noxious growths and does not give the land a fair chance to carry up to its full capacity.

Preparatory to the sowing of seed the settler observes how the area to be sown lies, and sets his seed out that he may with the greatest ease avoid irregularities in the contour of the country. This course enables him to avoid all steep grades which if approached directly would make the work unnecessarily arduous.

In order that the packhorses conveying the seed to the area to be sown can proceed with ease over the log-strewn land, it is necessary to saw passages through the big logs, and remove any material which obstructs the direction chosen when setting out the sacks containing the seed. When being packed on the horses, sacks of seed should be securely fastened to the pack-saddle, with the sewn end or mouth facing backwards. Placing the sacks in this position prevents them from being ripped open by contact with logs, &c., and saves the unnecessary loss of seed. The seed is sown by hand, and while being distributed is carried in a sheet made from an ordinary jute 46 in. sack. The sack is cut in such a manner that it fits over the sower's shoulders and body, and the portion which carries the seed is capable of holding from 30 lb. to 40 lb. of seed.

The seed is distributed by broadcasting over an area from 12 ft. to 16 ft. wide, known as the "cast." The darkness of the soil after burning shows up the bigger seeds (rye, &c.), and enables the sower to avoid missing, or overlapping, or double sowing.

When the seed is sown, small streams, which are so common on bush areas, should be bridged with pungas, which admirably suit the purpose. These bridges, together with the pack-tracks already referred to, enable the sheep to roam over the country; and it is further advisable to open up the main driving-spur, as this gives the sheep access to all parts of the area and makes the country easier to muster. The time given to making tracks and punga bridges is amply repaid by the number of sheep which by this course are saved from drowning.

SHELTER PLANTATIONS:

THEIR ECONOMIC VALUE TO AGRICULTURE.

JOHN MACPHERSON, Wellington.

THE benefit accruing to stock and crops from shelter must be fully apparent to every one acquainted with the rudiments of rural economy. Therefore the rapid development of the dairying industry and stock-raising in New Zealand makes it expedient that attention should be devoted to shelter plantations, the formation and proper distribution of which should have on the climate an influence beneficial to stock and crop.

The fact that the world's timber-supply is rapidly becoming depleted renders it a duty on the part of the State to see that the forestry resources of the country are fully developed. This, I think, will be best effected by the adoption of German methods of sylviculture—viz., growing dense forests of commercial timber. Apart from the operation of the State in this direction, a great deal can be done by private landowners in the way of improving the aspect of the country by providing shelter for stock and producing timber suitable for fencing and other useful purposes.

That shelter is essential to the economical production of stock is a well-established fact. Stock provided with shelter require less food to maintain the animal heat of their bodies. Where sheltered from the cold biting winds grass is more forward in early spring, and the same applies to all farm crops. Pasture lands that are adequately sheltered are less liable to be burned up during a time of drought than when fully exposed to the drying effect of sun and wind.

Nearly all the native timber-trees of New Zealand are of slow growth. Any one planting with a view of providing shelter and fencing material would require to plant varieties of rapid growth which would be durable as timber, and for that purpose larch and Spanish chestnut would be two of the most suitable varieties to cultivate. As they are both deciduous, however, it would be necessary to introduce a few of the fast-growing native trees and shrubs into the plantation.

Shelter plantations would take various forms to suit the situation and requirements for which they are planted. On agricultural land the shelter would require to take the form of a narrow belt planted against the prevailing wind and parallel with one of the sides of the paddock. Where fences intersect, forming the junction of four paddocks, there are pieces of land in the angles which cannot be ploughed. These portions (or corners) might be planted, forming a quadrifid figure. In the larger grazing-paddocks quadrifid plantations could be formed. These would afford shelter to stock from whichever point the wind may blow.

When laying out large shelter plantations in exposed situations, the plantations should be laid out in such a manner as to afford the greatest amount of shelter from the prevailing winds, presenting a convex exterior to the exposure. By this means the wind is deflected, and its strength and velocity are reduced. As New Zealand is subject to severe storms, the most exposed side of all plantations should be planted thickly for half a chain wide with suitable deep-rooted trees and hardy native shrubs or small trees, which would shelter the interior of the plantation and prevent a blow-down. The interior of the plantation would be planted up 3 ft. apart with larch intermixed with *Abies* and *Pinus* suitable for the soil and situation. The larch, in fifteen to twenty years, if the soil be suitable, should be of sufficient size to be useful for fencing, and, being a light-demanding tree, it requires to be thinned out gradually to allow those that remain the necessary space to develop.

Trees planted 3 ft. apart grow more rapidly than those planted at a greater distance, as they shelter one another. As the thinnings of the larch are of value for fencing when once they have attained a diameter of from 4 in. to 5 in., the thinnings will more than compensate for the expense of the closer planting.

In small areas and on the smaller farms a Spanish chestnut coppice would be very useful and profitable, if planted on dry gravelly soil or sandy loam. After being cut over, the stools throw up a succession of shoots, which grow rapidly during the first ten years, frequently attaining a diameter of from 4 in. to 5 in., and a length of from 30 ft. to 40 ft., and in from fifteen to twenty years would be sufficiently large for fencing purposes.

The system of managing a chestnut coppice or pole plantation is, when felling the poles, to leave a straight well-grown pole, termed a "second," every 40 ft. to 60 ft. apart. By the time the coppice is again cut these poles will be sufficiently large to provide material for gates and framing for buildings.

The peculiarity of Spanish chestnut is the durability of the timber of young trees and poles. Young poles of from fifteen to twenty years of age, if roughly stripped of the bark to allow of the sap drying out, will become almost as durable as matured oak. Chestnut fencing has been known to stand good in the ground for twenty-five years, while young unmatured trees of any other variety, with the exception of larch, would have no such durability. Spanish chestnut in from thirty to forty years will be useful for cart and wagon building, and for straining-posts and gate-posts, whereas oak would require from sixty to eighty years.

Where the soil and situation are suitable the rearing of a coppice yields a better return with less expenditure than growing timber-trees. Once a coppice is established there is no further outlay for replanting, the stools reproducing a succession of poles, which grow with greater vigour than transplanted trees.

In cutting down a coppice wood the poles must be cut very close to the ground, great care being taken to leave a smooth surface, which will throw the water off and prevent the stool from decaying. After being cut the poles must be removed from among the stools before they start to spring or shoot, otherwise the young shoots will be damaged. All the branches must be removed or burned. If burned, care must be taken not to damage the stools.

After the first season's growth the coppice should be looked over, and any vacant places filled up with good strong transplants. During the third or fourth year, if the shoots grow close together on the stools, they would require to be thinned out, leaving three or four good shoots on each stool, the end in view being to grow in from fifteen to twenty years poles sufficiently large for fencing purposes.

In forming a chestnut coppice the chestnut-plants should be planted 9 ft. apart, and filled up to 3 ft. apart with larch. When the chestnut and larch have attained a useful size, the whole could be felled during the winter season. The following spring the chestnut stools will throw out shoots, which by the end of the growing season will have attained a height of from 4 ft. to 5 ft. Chestnut, being of such rapid growth, would, although cut down, in two or three years' time be of sufficient height to provide shelter. It is not necessary to cut the belt all at once, but in sections, as the material is required.

Where the soil is a strong clay loam ash could be planted, as the timber is most valuable. In damp hollows Black Italian poplar would be a suitable tree to plant, as it is of very rapid

growth, and, although of no durability in the ground, it can be put to a great many other uses.

On the valuable agricultural land shelter hedges from 10 ft. to 20 ft. high could be formed by planting suitable native shrubs or trees of second magnitude. *Pinus muricata* intermixed with some of the hardy gums would make a suitable shelter-screen.

Shelter-belts, with the judicious introduction of a few ornamental standard trees, such as copper beech, horse-chestnut, and maples of sorts, &c., planted here and there in conspicuous places, would help to give New Zealand some of the beauty of rural England, whose park scenery is the envy and admiration of all her Continental visitors.

SILVER-BEET.

Many farmers are trying *silver-beet* this season for the first time. A common mistake being made is to plant on too large a scale. Better to do a small area well than a large area indifferently, for silver-beet must be nursed by the provision of a good seed-bed, proper manuring (the Department recommends 1 cwt. superphosphate, ½ cwt. guano, ½ cwt. dried blood, ¼ cwt. sulphate of potash per acre), and inter-cultivation until well established. Land suitable for mangels will be well adapted for silver-beet. It should be emphasized that crops may be secured for several seasons from the one planting, and therefore liberal treatment is well repaid. After each feeding-off the scarifier should be run through the drills. The crop demands careful management, the method of which is given in Bulletin No. 36 (new series) of this Department. A copy of this may be had on application.

The New South Wales Department of Agriculture has been testing silver-beet as a fodder for sheep at one of its experimental farms. Speaking of the experiment, the Superintendent of Agriculture, Mr. Valder, declares that wonderful results are being obtained.

To make the best use of good pasture lands it is necessary to provide small fields, rest the paddocks in rotation, and stock alternately with sheep and cattle. The dairy-farmer especially will find the use of sheep in the warmer months of the year an admirable means of maintaining his pastures at their maximum carrying-capacity.

LUCERNE-HAY MAKING.

PRIMROSE McCONNELL.

THE writer realizes that the most expert haymaker, even when possessed of up-to-date implements, cannot make good quality of hay when the weather-conditions are unfavourable. It is one of the branches of agriculture, and not the only one, upon which exact science cannot be brought to bear. On the other hand, practical experience, close observation, and the possession of good machinery will enable the farmer to make the best of any circumstances that may arise. Not only the state of the weather at the time of cutting, but also that previous to cutting and the stage of the plant-growth must be taken into consideration. If the previous weather has been wet, the wet land and the watery material will greatly hinder curing operations. On the other hand, if it has been dry, the material will contain less water, and, the ground being drier, the process of curing will be comparatively short.

It is wise to see that all haymaking machinery is in good working-order some time before it is necessary to commence operations. In fact, the better plan is to have everything overhauled immediately the season is over. Every minute during haymaking should be made the most of, and no loss of time is so annoying as that which a little forethought might have prevented. Even when implements are in good order to commence with, breakages often occur through omitting to gather off the paddock, before closing for hay, all obstruction in the shape of sticks, stones, wire, &c.; or it may be through an unmarked and forgotten boulder or stump. Such breakages often cause so serious delay as to ruin the hay crop completely

To make the best quality of lucerne hay the crop should be mown just when the plants are coming into bloom. When cut at this stage, not only is the quality of the hay better—having a higher feeding-value, and being altogether more digestible—but the young shoots which are just starting from the crown of the plants will grow much more vigorously than when the crop is cut at a later stage, because the shoots will then be of such a length as to be topped by the mower and their aftergrowth greatly hindered. As a matter of fact, cutting lucerne at a comparatively early stage means four crops of hay instead of three, and the quality of hay will be much superior to that resulting from more

Lucerne-hay Stack at Ruakura

mature plants. Lucerne should not be cut for hay when wet. In the North Island the securing of the first crop will always be attended with considerable risk on account of the moist weather which usually obtains at the beginning of the season.

Probably the best plan is to depasture the first crop, or convert it into silage. At this station (Ruakura) this season the first crop was cut on the 7th October with the intention of making hay, but the weather was so unfavourable that it had to be turned into silage after lying eight days on the ground. It will be interesting to note whether green material will make good silage after undergoing more than a partial drying. To ensure sufficient moisture the stack received a liberal watering. When the actual object is to convert lucerne into silage, regardless of weather, the plants should be cut at a more mature stage than for haymaking, as immature lucerne makes silage of a very soft, watery nature, particularly so when unmixed with other green fodder. In the writer's opinion, when weather-conditions are favourable there need be no hesitation in making hay in preference to silage; indeed, good lucerne hay is almost invaluable. As soon as thoroughly wilted, and before it has become scorched by the sun, the material should be raked into wind-rows. In settled weather it may be left in the wind-row until stacked, but, in order to ensure a minimum loss of leafage and preserve the bright-green colour, it is undoubtedly better to put the crop into cocks and cover immediately with caps. As the leaves contain much more protein than the stems, everything should be done to prevent loss in this direction; and if allowed to lie in the swathe for several days in a hot sun, much of the leafage will become so brittle that it will be lost in the after-handling, and the resulting hay be much reduced in value.

When necessary to turn the swathe the best implement for this purpose is the swathe-turner, as the action is so gentle that little or no waste of leafage arises from its use, while it leaves the swathe in the very best form for speedy drying. To ensure a minimum of loss in the after-handling, the wind-rows or cocks should be swept to the stack and elevated with one or other of the useful lifts which are now on the market. Forking on to a cart and off again, plus the continual tramping on the cart, increases the loss in leafage very considerably, and the operation of stacking takes much more time.

As lucerne hay turns rain very badly, the cocks should be built carefully from the bottom (not rolled into heaps), and should be rather tall and thin. Providing caps for a large area means a considerable outlay, but it is expenditure that will give a good return in the end. If the material has been cocked in rather a damp state the drying process may be much hastened by occasionally

moving the cocks bodily on to new ground. This operation requires two men, but by the aid of two slender poles, which are thrust under the cocks, a large acreage can be gone over in short time.

In making a lucerne stack much good will be done by constructing a foundation of logs in such a manner as will ensure a thorough draught from end to end of the stack. By such a system lucerne hay may be stacked in a much greener stage than when there is no circulation of air underneath.

When it is intended to make three or more cuts of hay in the same season from the one field, and when a shed is not available, the stack foundation should be made sufficiently long to hold all the cuttings, and as each cutting will provide only a comparatively

The Hay-tedder.

thin layer on the stack there is less danger of overheating. To keep the rain off (failing a shed) two strong poles with a pulley at the top of each may be erected, one at each end of the stack. A rope is run through the pulleys and attached to a lighter pole (3 in. water-piping will do) which runs lengthwise of the stack between the two end poles. Canvas covers are then thrown over the centre pole, which is lowered or raised at will by means of the ropes and pulleys on the end poles. It will easily be seen, however, that a shed with a movable roof is more economical in the end than the system described above, as the canvas covers soon wear out, and when the stack is completed the further expense of thatching has still to be borne. It is impossible to expend too much care in topping out a lucerne stack, and thatching operations should be carried out as soon as possible.

CALVING.

SOME DIFFICULTIES AND THE NECESSARY AFTER-TREATMENT.

W. G. Taylor, M.R.C.V.S.

The most common difficulties met with in calving and the best means of dealing with them were described in last month's issue of the *Journal.* The procedure there outlined should enable any careful farmer to treat such cases successfully. Directions are given in this article more particularly in regard to the afterbirth, the proper removal of which does not receive the attention its importance to the well-being of the cow demands. I would emphasize again in all this work of rendering aid to the cow at the calving period the great importance of cleanliness and care, and of taking every means to ascertain the nature of the case before attempting to render assistance.

Though the calf may be presented normally, there is occasionally a great difficulty in removing it, generally occasioned by the fact that the cow has been in labour for some time and the natural lubricating-fluid has consequently been expelled from the womb. These cases only require some lubricant together with a certain amount of force to move the calf. Other presentations are when the calf is coming with the hind legs first. In these cases it is only necessary to rope the two hind legs, and then pass the hand in to ascertain whether the tail is in the normal position. If not, this must be rectified, and the hand should remain above the root of the tail until the hind quarters are in the passage. Otherwise the tail will jam above the top of the pelvic bones, and any strain put on will tear the roof of the vagina or womb. When there is a breach presentation, with one or the two hind legs dropped below the edge of the bone at the entrance of the womb, it is in ordinary cases a very simple matter to elevate the hind legs into the correct position for presentation. The method of handling the foot must be similar to that used in raising the fore feet, as given in the preceding article. As soon as the feet have entered the passage and have been roped force should be applied as in the normal presentation, or perhaps a little more pronounced, in an

upward and a backward direction. In cases where the four legs are presented with the head, the operator should try to push back the hind legs; but before doing this the head and fore feet should be roped, as in pushing the hind legs back the operator may lose the head or a fore leg, which only prolongs the delivery. If it is impossible to push back the hind legs the best thing to do is to obtain the services of the nearest veterinarian, as it requires skilled treatment to deal with such a case. The proper manner of treatment in these circumstances with the head presented is to remove both hind legs—a difficult matter even in the hands of a professional man. There are a number of other presentations which have not been mentioned, but application of the general rules already given will help the farmer considerably under most circumstances. Occasionally one meets a case in which the presentation is so complicated that no rules as to treatment can be laid down. In these cases it is always wiser not to interfere with the animal until professional aid can be obtained. It is only by long experience that sufficient skill is acquired to succeed in the operation.

The after-treatment of a cow which has experienced trouble in calving is often a great factor in saving the animal and preventing subsequent trouble. If the animal is much exhausted after the calf has been delivered she should be given a good stimulant, probably the best thing being half a bottle of whisky in milk. The womb or the uterus should be flushed with warm water at a temperature of from 102° to 103° F., to which has been added some disinfectant. If necessary, the uterus should be washed out two or three times a day afterwards. If the animal is in a low condition the cleaning need not be removed at once, but should be removed the next day, but the flushing-out must not be neglected. The cow should be rugged and made as comfortable as possible. Where she is not inclined to eat, tempting food should be provided in the shape of bran-mash, crushed oats, good hay, sliced roots, or cut grass.

To take the cleaning away the proper procedure is first of all to wash the hands well with a disinfectant and to lubricate the arm and hand. Pass one hand into the passage—the other hand taking hold of the extruding portion of the cleaning—and following up the membrane until the point of attachment is detected. It will be found attached to a cotyledon. This cotyledon should be grasped from the bottom with the first finger and thumb and gently squeezed, and the membrane then gently elevated over its surface. This process must be adopted with every cotyledon. After a little experience it will be found it can be done fairly

quickly. There should always be a certain amount of strain kept on the membrane by the hand which is holding it on the outside, as it makes it much easier to trace up the points of attachment. Great care should be taken in not using too much force, as if too much force be used the cotyledons are apt to be torn off. When the cleaning has been removed it is always advisable to flush out the womb thoroughly, as this produces a contraction of the womb, which is necessary for the well-being of the animal. Often the effect of removing the cleaning will cause the womb to contract, and if this does contract during the process of removing it will be found very much easier for the operator. No cleaning should be allowed to remain in any cow longer than twenty-four hours. Of course, some people contend that the cow will not be injured if the cleaning be allowed to remain for five or six days. This often happens, but it is extremely liable to cause blood-poisoning in an animal, and too often this occurs in a valuable cow. This rule as to the effective removing of the cleaning applies in all cases, whether trouble has been experienced or not.

To flush out the womb properly the ordinary funnel and rubber tubing is probably the best and the easiest to use. Always use a glass or an enamel funnel, preferably the latter, as it is not so likely to get broken. To do it properly the tube should be greased on both sides with vaseline, lard, or some non-irritant oil, and the funnel should be held down. As the tube is passed into the womb it should be given a half-turn, bringing the funnel into the required position. One hand should be passed into the womb with the tube. Then the fluid can be poured through the funnel. Four or eight gallons can be used in flushing out a cow. It will not hurt her, and probably may save a good deal of subsequent trouble.

It is perhaps not necessary to emphasize that the cow about to calve should be treated with some consideration. If possible, a dry and sheltered place should be prepared for her, especially where trouble is expected. If any manure or mud is adhering to the cow it should be removed, and the hinder portions of the cow should be well cleaned. Generally, everything should be carried out with the greatest care and under the most cleanly conditions.

The champion Shorthorn bull at the last Buenos Ayres show sold for £6,986, the reserve champion for £3,930, and the first prize two-year-old for £3,668.

DR. BABCOCK.

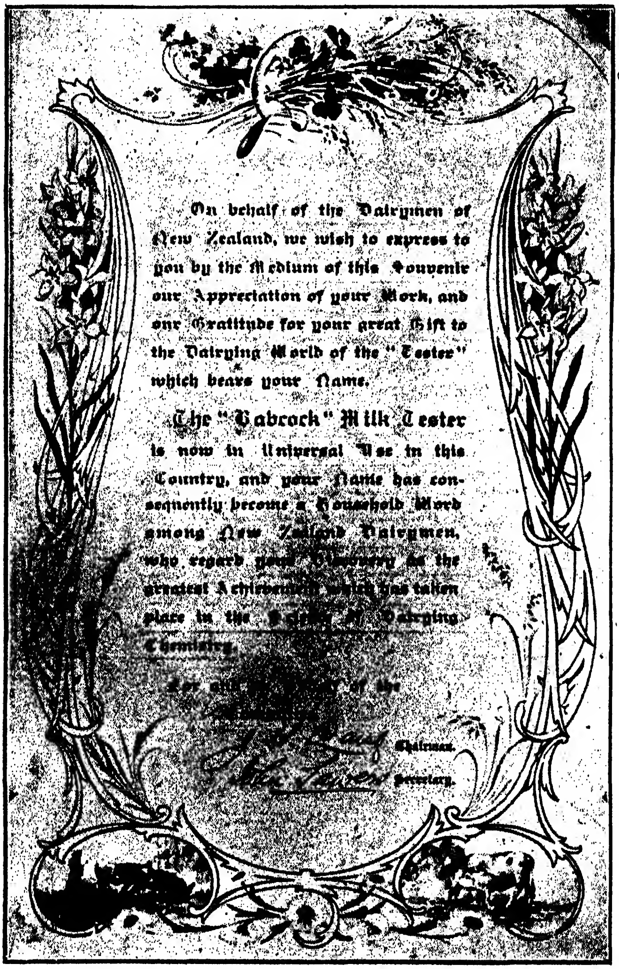
AMERICA'S GREAT DAIRYING CHEMIST RETIRING.

The announcement that Dr. Babcock, Professor of Dairy Chemistry in the University of Wisconsin, is retiring is of more than passing interest to the dairymen of this Dominion. In no other country in the world was the invention of the famous Wisconsin chemist so rapidly and so generally adopted as was the case in New Zealand. Dr. Babcock, imbued with the fine spirit of the worker in the field of agricultural research, refused to patent his discovery. He presented it to the dairymen of the world, considering in this abnegation of self-interest that nothing should be done to discourage the adoption of a principle which if generally accepted would revolutionize the industry to which he had devoted his life.

DR. G. M. BABCOCK.

Not only was payment for milk on a butter-fat basis generally adopted by our buttermaking companies soon after the system was made known, but within a very few years the cheese companies of New Zealand discarded the payment-by-gallon principle in favour of the butter-fat basis as determined by the Babcock test. For many years the test has been in universal use by New Zealand dairy companies; indeed, it is probable that there is no other country, including even the inventor's own State, where every pound of milk and cream accepted for manufacture — and this with an output valued last year at £4,200,000 — is purchased under the Babcock test. New Zealand dairymen are also exhibiting commendable enterprise in making that more extensive use of the test which promises to effect even a greater revolution in their industry than the purchase of milk according to its fat-content — the ascertaining by weight and test the exact annual production

of each individual cow. Herd-testing associations are rapidly multiplying in the main dairying districts, while an official register-of-merit scheme is well under way in connection with the Jersey,



On behalf of the Dairymen of New Zealand, we wish to express to you by the Medium of this Souvenir our Appreciation of your Work, and our Gratitude for your great Gift to the Dairying World of the "Tester" which bears your Name.

The "Babcock" Milk Tester is now in Universal Use in this Country, and your Name has consequently become a Household Word among New Zealand Dairymen, who regard your Discovery as the greatest Achievement which has taken place in the [illegible] of Dairying Chemistry.

[illegible]

Chairman.

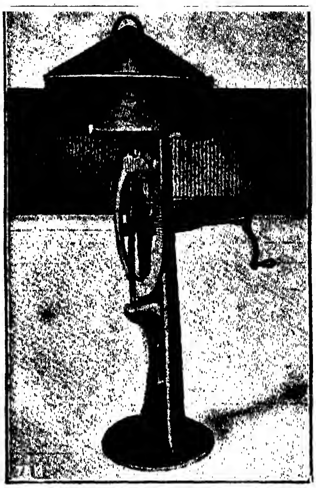
Secretary.

THE TESTIMONIAL PRESENTED TO THE INVENTOR BY NEW ZEALAND DAIRYMEN.

Holstein, and Ayreshire breeds societies. The Babcock test has, indeed, become a household word in New Zealand.

That the dairymen of this country early recognized the value of Dr. Babcock's conspicuous service to their industry is proved by the fact that in the year 1891 they presented him with a handsome testimonial, a hand-painted volume, the first page of which is

reproduced (for the first time in any publication) on the opposite page. Shortly after this New Zealand testimonial was despatched to Dr. Babcock the Legislature of his State presented him with a gold medal in commemoration of his services to the dairy industry.



THE FIRST BABCOCK TESTING-MACHINE.

The milk - producer owes more to the scientist than does any other class of primary producer. To such a disinterested worker in the scientific field as Dr. Babcock he is particularly indebted. In the history of the dairy industry Dr. Babcock's name will occupy an honoured place in the roll of those who have been instrumental in raising the industry of dairying from a crude undertaking into a great systematized business. Dr. Babcock, a scientist of brilliant parts and of an unselfish and lovable nature, will retire into private life with the best wishes of a vast army of admirers throughout the world.

At the Weraroa Experimental Farm this season six varieties of silver-beet are being tested. Altogether 7 acres are being put into this crop. Thirty-five varieties of maize are under test, and twelve varieties of millets. There will be 14 acres of lucerne planted this year.

Mr. W. G. Stead, of Reporoa, reports that *Wakeman's fescue* is doing exceedingly well on the light pumice soil of the Kaingaroa Plains. The plants in the experimental plots of Mr. Stead's farm seeded last year, and this spring numerous young plants have made their appearance. These plants were obtained from the Department, and a small quantity of seed obtained from Mr. Wakeman is being planted at Wharepania. It is hoped to save sufficient seed this year to carry out a field test.

The rape-manurial experiments at the Ruakura Farm of Instruction are an interesting study at the present time. The guano is showing to advantage as against superphosphate, slag, slag and superphosphate, and bones and superphosphate. Liming has given decided results, particularly on the heavy iron-pan portions of the paddock. Two rows manured with sulphur alone are much superior to two unmanured rows growing side by side. The use of sulphur in small quantities is undoubtedly beneficial to this soil, and its effect is quite apparent on pasture, swedes, and rape.—*Primrose McConnell.*

THE CODLIN-MOTH:

ITS LIFE-HISTORY IN NEW ZEALAND.

W. A. BOUCHER.

THOUGH the codlin-moth is one of the most troublesome pests of the apple and pear grower, there is still, especially among those who have taken up fruit-culture in recent years, a want of thorough understanding of the pest itself and its life-history, which too often leads to the methods of suppression adopted being ineffective.

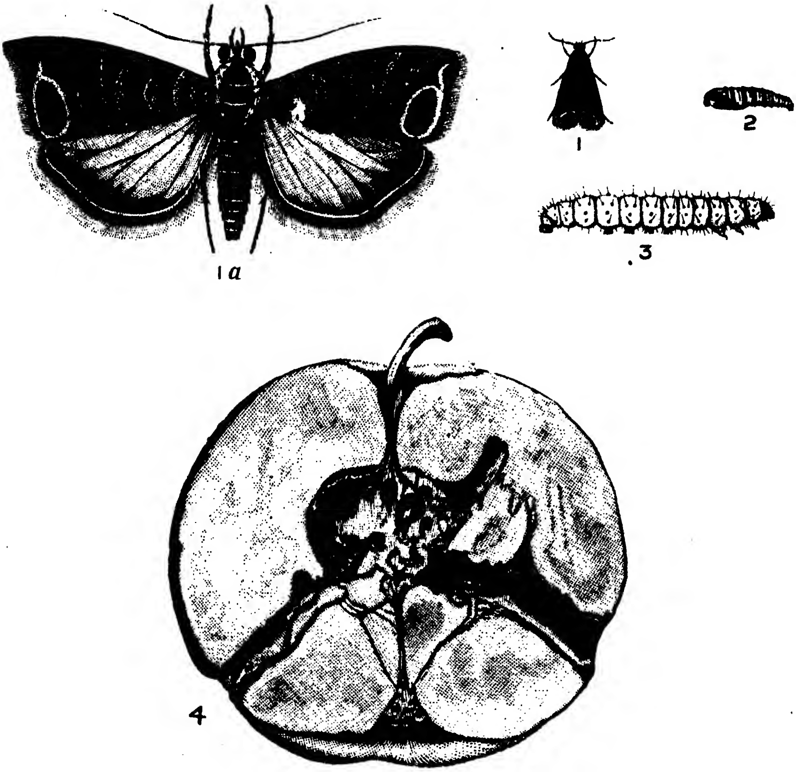
The results of observations of the moth during many seasons may be of interest and assistance in the future warfare against the pest.

The Egg of the Moth.—A great deal of misapprehension seems to exist as to—(1) The appearance of the egg; (2) where the egg is laid; (3) the period of incubation, if it may be so called.

(1.) In size the egg is about as large as the head of a small pin, and when first laid closely resembles a minute drop of milk deposited upon the surface of the apple. In shape it is sometimes almost circular, but varying often to oval, and irregular. From being opaque when first laid it soon becomes transparent, and during the period of transparency is not easily detected, the colour of the apple showing through, and making the egg appear part of the apple itself. In the next stage of development, while remaining transparent round the edge and in the centre, the egg shows a faint red line between the two transparencies, which becomes more defined day by day, and to which becomes attached a faint white film as the body of the insect develops. In the final stage the head can be plainly seen, and if the weather is favourable the minute grub emerges through a hole of its own making in the outer shell.

(2.) The egg is laid usually upon the apple, but not infrequently upon a leaf associated with a cluster of apples, or upon the twig. Two and sometimes three eggs will be found upon a single apple or leaf. If laid upon the apple the egg is generally deposited in some spot where it is least likely to be injured by contact, either the depression formed by the calyx, or that formed by the stem in single apples, or near the stem where a number of apples

are in a cluster. Occasionally, but less frequently, the egg will be found on any part of the apple. The prevalent idea that the egg is laid in the blossom or directly in the calyx has undoubtedly arisen from the fact that, upon whatever part of the apple the egg has been laid, the grub will frequently make its way to the eye or calyx, as affording a natural and ready protection, and enter the apple there.



CODLIN-MOTH.

Figs. 1 and 2, natural size; 1*a* and 3, magnified. Figs. 1–3, from N.S.W. *Ag. Jour.* Fig. 4, from nature.

(3.) The period of incubation lasts from seven to ten days, much depending upon the heat of the weather, particularly at the time when the grub, fully developed, is awaiting a favourable opportunity to emerge from the shell. I have succeeded in hatching the first moths from larvæ of the previous season on the 24th November, and on the following day have discovered in the orchard the first egg noticed during the season. From the commencement of a season I have kept a close watch for the eggs, as, on account

of the well-known shyness of the moth, more knowledge may be gained of its habits by the presence or absence of eggs than by attempting to discover a moth, which is seldom seen, and even then flits away instantly when disturbed. From the 25th November I have found the eggs in steadily increasing numbers up to the last week in January and first week in February, from which time the numbers have decreased up to the last week of March. Throughout the whole of this period eggs in every stage of development may be found every day, showing that the moths are always present during that time, though in the greatest numbers during the hottest period of summer. As the larvæ of one season remains dormant for varying periods, some developing into the moth early in the following season, others remaining dormant almost through and until quite late in the following season, it is evident that we have to contend with not only a constant succession of moths from the larvæ of the previous season, but also those produced from early-developed larvæ of the same season.

ENCOURAGING FRUIT-CONSUMPTION.

NATIONAL APPLE DAY.

One of the happiest ideas that have come to us from American fruitgrowers is that of a National Apple Day, the object being to bring before the great communities of city consumers, in the most attractive manner possible, the virtues of the apple, not only as a choice item of dessert but as a valuable everyday article of diet. The idea could be copied with distinct advantage in this country. As the National Apple Day would be primarily a great advertising campaign on behalf of the king of fruits, the scheme would require to be designed on a generous scale, and in a manner which would appeal to the greatest number of consumers. It may be rather ambitious to adopt one American feature—the free distribution of apple-pies (special machinery at the Spokane National Apple Show turned out these pies at the rate of 2,250 per hour). However, it would certainly pay well to give choice apples for sale in the streets, the proceeds to be devoted to the local hospital. With the co-operation of the charitable ladies of the community this distribution of apples would enable, quite apart from the circulation of the fruit, most attractive advertisements to be secured by fruitgrowers' associations by means of specially decorated hand-carts, which if stationed in the main thoroughfares could be used as sources of supply for the lady sellers. Apart altogether from the benefit

which would accrue to the grower in this gift of apples for the benefit of a hospital, there would be the added satisfaction of knowing that some contribution had been made towards the alleviation of the sufferings of those whom adverse fate had made inmates of the institution, while a special gift of apples on such an occasion to the little sufferers in the children's ward would be a graceful and humanitarian act.

There is no limit to the possibilities of Apple Day as a means of extending the consumption of fruit. It is declared that in some American cities, where the Apple Day is an annual event, the sales of fresh fruits have increased by several hundred per cent. in two or three years.

A National Apple Day might well be conducted in connection with a National Fruit Show, an idea already suggested by the Department to fruitgrowers' associations. The combination would be admirable. The Apple Day could be made a special feature of the show. While the public may not be persuaded to visit the show by ordinary means, the apples would be taken to them, and this would probably have the effect of inducing them to attend the show. The consumer and the producer would thus come in close touch with each other, to their mutual advantage. What the fruitgrowers of other countries are doing to extend the use of their products surely we can do with equal measure of success. All that is required to give practical effect to the idea outlined is the necessary co-operation on the part of our fruitgrowers' associations, the majority of which have on their boards of management men who could be trusted to carry the National Apple Day and the National Fruit Show movements through to a successful issue.

A REMINDER TO PEACH-GROWERS.

One of the most serious troubles of peach-growers in Hawke's Bay and Nelson Districts is the red spider. The pest is a dangerous one, and is somewhat difficult to control, owing to the tender nature of the foliage of the peach-tree. The best summer spray, and one which can be recommended as quite safe to use, is whale-oil soap. To prepare this, warm 14 lb. of whale-oil, and in another vessel dissolve 2 lb. of caustic soda. Let this cool until it is just warm, and then slowly add the warm oil, stirring well. When cold this will set into a hard soap. Boil for about half an hour 5 lb. of this soap, 7 oz. of sulphur, and 5 oz. of caustic soda in 3 gallons of water. Make up to 40 gallons. If possible, select a dull day for spraying, or spray in the evening.

COLONIAL WASHINGTON APPLE.

GEORGE STRATFORD.

THE accompanying illustrations of Colonial Washington apple show how profusely the trees are blossoming this season. The photographs were taken in the orchard of Mr. J. Jones, Palmerston North. The spur shown in the picture contains thirty-nine separate blossoms.

COLONIAL WASHINGTON APPLE-TREES IN BLOOM.

The Washington apple is considered one of our best late cooking varieties. It is a good keeper, remaining firm up to the end of October under ordinary storing conditions. The tree is a very vigorous grower of the lateral-bearing type, and is practically free from woolly aphis. It attains a great size, often carrying from ten to twenty bushel cases per tree. The majority of the fruit is borne on the laterals. When pruning, these laterals should be

left intact until the fruit begins to diminish in size, when thinning-out will be required.

The tree from which the photograph of the separate spur was taken is about seven years old, and up to the present season has

A PROLIFIC SPUR.

borne very little fruit, owing to the hard cutting-back it had received during the winter. However, from advice given, practically no pruning has been done for the last two seasons, with the result that the tree is carrying a heavy crop.

In a series of experiments conducted in Belgium to ascertain the most advantageous depth of the drains in silty soils it was found that a depth of 3 ft. 4 in. gave a better yield of crop with greater freedom from disease than drains of depths of 2 ft. 8 in., 4 ft., and 4 ft. 8 in.

APPLES FOR EXPORT.

W. A. BOUCHER.

THE period is rapidly approaching when fruitgrowers will be making preparations to ship a portion of the season's crop to outside markets. It is very satisfactory to note that the demand for New Zealand apples is such that only increased production on an extensive scale will enable growers to cope with it in a satisfactory manner. Some years ago many growers were dubious as to whether any surplus of their apple crops over and above what was required to supply the requirements of the local markets could be satisfactorily and profitably conveyed to oversea markets. Those ideas have now been entirely dispelled, and whole-hearted confidence in the future of the industry has been displayed by the extensive planting of recent years. We are now looking forward with confidence to the time, now not very far distant, when many young orchards will be yielding such crops of fruit as will greatly increase the total output and enable the export trade to be carried out on a far more extensive scale than has been possible hitherto. The completion of the Panama Canal will certainly open up fresh markets for the produce of this Dominion, and apples assuredly will not rank as the least important of such produce.

However, there are some things that growers must always bear in mind, among them being the size and shape of cases best adapted for the export trade, the question that packs are uniform as to grading and packing—in fact, complying to the utmost with the requirements of any markets to be supplied. The size and shape of the case is a most important consideration, for while one case when opened up will display the contents to great advantage another will not. As is well known, buyers, when purchasing, are largely influenced by appearance, consequently the case and even the wrapping-paper will help to determine the price to be offered. The ideal case is one that will contain a bushel of fruit or a net weight of about 40 lb.; one that is easy to pack, and attractive to the eye when opened for inspection. Such a case was described in the August issue of this *Journal*. Uniform grading and packing are most important, for buyers of large lines naturally prefer, and expect to secure, complete uniformity throughout any number of cases they may wish to purchase. This branch

of the business has been brought to such a degree of perfection in some parts of America that orders for, say, even 100,000 cases complying in every respect with the requirements of buyers can be filled without difficulty.

Most important of all perhaps is the necessity for exporting only the very best of fruit according to variety and grade. Every care should be exercised to see that no fruit is packed that shows infection by insect pest or fungus disease of any kind. Fruit also showing blemish—due to attack by leaf-roller caterpillar or bronze beetle—or abnormal growths should be regarded as altogether unsuitable for export. In fact, only fruit that is really perfect in every respect should be packed for shipment to oversea markets. The ideal is a high one, no doubt, but it has already been achieved in North America. Very large consignments of apples from Canada and the United States have been landed from time to time at the various ports of entry throughout the Dominion. A careful inspection has demonstrated that no fault could possibly be found with any portion of those consignments. Under such circumstances buyers readily repeat their orders, and a trade is established which almost defies competition so long as a uniform standard is maintained.

In America uniformity of pack is due to the fact that the fruitgrower rarely packs his own fruit. In most instances central packing-houses have been established where all the fruit is carefully examined, sorted, graded, packed, and shipped. No doubt, as the export trade develops here a similar system will be adopted, with considerable benefit to the growers and industry generally throughout the Dominion.

The best time to get rid of weeds in a lucerne-field is before the lucerne is sown.—*A. C. Arney, University of Minnesota.*

Subsequent cultivation can remedy the poor seeding of arable land, but the evil of weak and impure seed can never be overcome in the permanent pasture.

Mr. J. W. Collard, Orchard Instructor, Whangarei, reports that considerable damage was done to stone-fruit crops in exposed positions in that district by a storm on the night of the 16th November.

Drainage and cultivation are essentials in bringing land to a high state of fertility, while the presence of humus is equally necessary in the most profitable production of plant-life.

CLOVER-DODDER (CUSCUTA TRIFOLII).

A. W. Green.

Clover-dodder is a slender, thread-like, leafless parasite, which involves and eventually destroys the host plant on which it preys. Its host is the clover, and, as is the case with many parasitic plants, the name of the host gives origin frequently to the specific name of the parasite. In some countries clover-dodder causes great loss to farmers, but luckily in New Zealand it is not common.

Every effort should be made to deal effectively with the parasite immediately it is observed. Though limited to small patches at the commencement, once established it will spread rapidly over the field, climbing on to all clovers within reach and bringing them to final destruction. In dairying districts where permanent pastures are laid down, and also on unploughable bush land, loss due to clover-dodder would be considerable. This being the case, care must be taken that it is not introduced as an impurity in grass or clover seeds.

A characteristic of this parasite is that first plants are produced from seeds, which germinate in the soil in the same way as the seed of other plants. After germinating, the seedling has the appearance of a thin cotton thread devoid of leaves. When sufficiently grown to take hold of a neighbouring clover-plant, or even another dodder, it loses its attachment to the soil, and from this onward all connection with the soil ceases, the plant continuing its life as a parasite. The root is of no further value and withers away. The stem soon gives rise to branches each of which lays hold of the host, and shortly afterwards is capable of separate existence if broken off. By this means new centres of infestation can be established. Immediately a contact is made the sensitive stems coil tightly around their prey, force suckers, termed "haustoria," into its tissues, and feed on the sap. Ultimately the clover-plant presents a tangled mass of threads.

Visiting farmers at Ruakura Farm of Instruction have stated that these threads become so numerous and matted together that they frequently block the mowing-machine in the cutting of clover hay. A single thread no thicker than fine cotton has here been found extending a distance of 4 ft. in search of other hosts, and at

the same time sending out fourteen branch threads. The accompanying photograph shows these thin, almost colourless, stems.

Dodder growing on Red Clover in a Flower-pot at Ruakura Farm of Instruction.

Dodder is a typical example of a perfect parasite. It possesses no chlorophyll, and hence cannot decompose the atmospheric carbon dioxide. Leaves are entirely absent, the whole of its nourishment being derived from the plant to which it is attached. It lives, therefore, on live sap already elaborated by the clover. As the clover comes into flower so also does the dodder. The flowers are small, white, bell-shaped, and are borne in clusters. Each flower produces a two-celled capsule, each cell containing two roundish seeds. The flower-clusters are very numerous, and as many as eighteen flowers are found to a cluster — quite a usual experience—some idea of the rate of reproduction by seed may be formed.

A point which materially assists in the eradication of dodder is that the plant is an annual, and if flowering be prevented no reappearance of the pest the following year should be possible.

Poor preparation of the seed-bed and competition of weeds, declares Professor C. W. Pugsley, of the University of Nebraska, are the two principal causes of lucerne failure. Other reasons for failure are poor seed, lack of fertility, acid land, lack of inoculation, poorly drained land, and lack of moisture. The first six can be controlled by the farmer, and the last two can be largely influenced by him.

THE MILKING SHORTHORN.

TYPE TO AIM AT.

W. DIBBLE.

IN more recent years the difficulty of securing purebred Shorthorn bulls of a definite milking-strain has led in many cases to the Shorthorn being discarded in favour of what may be termed the "special-purpose" breeds. The fact remains, however, that many of the earlier strains of Shorthorns known to this country were noted for their milking properties, and that even at the present time, notwithstanding the booming of other breeds and the large sums of money expended in strengthening them by the best imported strains, the majority of the crossbred herds being milked in the Dominion at the present time show distinct traces of Shorthorn blood. It must be admitted that in many cases the breeds have been so intermixed—a bull of a different breed being repeatedly introduced—that it is difficult to say to what breed the milking-power must be credited. This fatal change of blood has been more marked during the past five or six years. Up till that time the Shorthorn character dominated the blood in the majority of our crossbred herds; whereas at the present time it is difficult to find a herd of cows of a good Shorthorn standard, and this only where the owner has consistently used Shorthorn bulls.

Twenty-five years ago we had a splendid type of milking Shorthorn bulls available, but, unfortunately, cheapness was the main consideration, and with the consequent lack of appreciation at that time of the purebred dairy sire it did not pay to breed them. In those days I have taken calves a few days old from heavy milking Shorthorn stock to the saleyard, 80 lb. to 100 lb. each, and on a number of occasions have had to accept a few shillings a head for them.

The popularity of the breed from a dairying point of view has suffered considerably of late years by the difficulty of being able to purchase purebred Shorthorn bulls of undoubted milking-blood. The formation of a Milking Shorthorn Association, which intends to introduce the important principle of breeding according to actual performance, and only registering the progeny of stock having officially checked

An English Non-pedigree Shorthorn

milking-records, will assuredly have the effect of removing this difficulty. When the dairy-farmer is able to purchase a milk-record Shorthorn bull we may expect to see a boom in this great general-purpose breed. The feeling is widespread that if only a supply of definite dairy Shorthorn bulls could be depended upon the development of Shorthorn herds would make rapid headway. The increasing value of beef-stock gives the Shorthorn cow an added value, for there is no denying the fact that of all breeds of dairy stock there is no other which equals the Shorthorn for producing steers which it will pay to fatten.

From this it is not to be supposed that the type of Shorthorn favoured is that being developed by the breeder of beef-stock, and decorated by judges in some of our dairy Shorthorn cow classes at agricultural shows, but the Shorthorn cow which is distinctly more of a dairy type than a beef type. While the value of the Shorthorn steer is appreciated, it is the milking-value of the dam that must be the main objective.

The sensational record of one or two exceptional animals will not make a herd so profitable as the returns from a herd of good uniform production—a collection of average but persistent milking cows. After all, it is what a cow will give in a year which determines her value, and it is the average production of the whole herd which decides the farmer's profits.

The special-purpose cow is certainly a payable proposition when she produces in a year the extra quantity of milk (or butter-fat) over the general-purpose type to make up for failure to produce a steer it will pay to fatten, but the question of profit must be decided on the herd, not on any individual members of it. The only Shorthorn cow which it will pay the dairy-farmer to consider is the deep-milking type. It may be well, therefore, to describe the ideal to aim at.

Look to the head first of all: it is invariably the index of the whole animal. It reflects the character, and especially the constitution. There should be a good width between the eyes, and these should be large and placid. A good muzzle is much to be desired. The nostrils should be large and the mouth capacious. Good breathing-capacity is necessary to a good constitution, and a large mouth is essential to a strong feeder, a qualification a cow must possess if she is to manufacture milk on a liberal scale. It was generally remarked by old authorities that the heavy milker always carried a dished face. As a matter of fact, it was the dished appearance provided by the large eye and the expanded nostril which gave rise to this expression. As to constitution, the head provides an admirable index, of which the eye and the nostril are the chief

AN ENGLISH CHAMPION PUREBRED DAIRY SHORTHORN.

features. Indeed, to the keen judge of dairy type the general appearance of the head and the way in which it is carried is a powerful key to an animal's capacity, and this applies to the bull even more than to the cow, though many of our breeders of pure-bred stock do not attach to this portion of an animal the importance they should. Next to the head the heart-girth should be looked to, for this must be good if a strong-constitutioned beast is to be secured, and however well built a cow from the milk-producing point of view, she cannot be considered if she has not the power to produce to her maximum capacity. The bull should be particularly strong at this point. I have known a bull of weak heart-girth that never left a long-season milker. The barrel is the next character to which importance must be attached. Unless a cow has the "boiler" capacity she cannot be expected to manufacture a large quantity of milk. In general conformation the animal should be as wedge-shaped as possible, as distinct from the blocky type of beef-producing cow. She should be wedge-shaped in that she should be fine at the fore end and broad at the business end. The shoulder should be sharp, whereas with the good beef-animal the hand may be placed between the points of the prominent shoulder-blades. The loin should be wide across, and there should be a good length between the croup and the buttock. The thighs should be fairly fine, and be sufficiently wide apart to allow room for the bag. The "milk" veins are of more importance really than the udder in determining milking-capacity. As a matter of fact, the actual size of the udder has little to do with milking-power. The veins should be prominent, and extend as far forward as possible to the milk-portal, or milk-well, which should be large enough to admit the full tip of the middle finger. The veins should run well into the udder. A prominence of veins on the udder itself is an excellent sign. I have noticed that the majority of exceptional milking-cows have veins on the udder to a marked extent. The udder should be of a fine texture, falling away to loose folds when empty; the other extreme being an udder as big after milking as before. I have seen some of the poorest cows with the biggest bags in the herd. There are other more or less fancy points in the judging of a cow which need not be discussed here, such as length of tail, certain indentions in the spine, &c. It is said that cows will milk in all shapes, and that therefore it is a mistake to attach too much importance to milking-points. There is, however, one exception to this: a good and consistent milker will never be found to be an animal of weak constitution.

In judging a cow it is a mistake to attach too much importance to minor points. Given the right expression and character in the

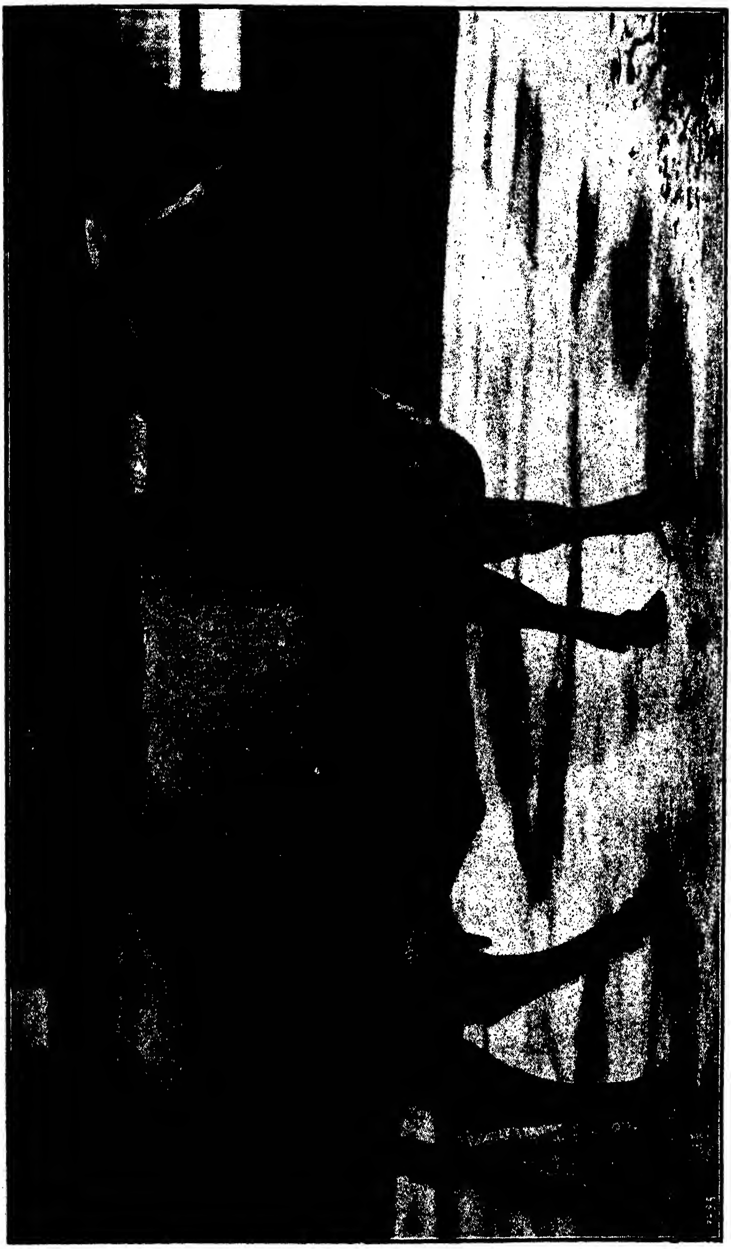
A Beef-type Champion at Home.

face, a good wedge shape, the desired heart-girth (and other points indicative of constitution, particularly in the head), a big barrel, and the right texture and vein-development, other points may be more or less disregarded. After all, the only definite guide to milking-capacity is the year's production of milk and butter-fat. In many cases excellent cows, according to conformation, have failed at the bucket. But the method of early management, especially in the heifer stage, should be known before condemning accepted rules for the judging of dairy form. Many a very promising dairy cow has been ruined as a heifer by being brought in in the spring and prematurely dried off because of the absence of the necessary succulent feed in the summer.

It is a mistake to discard a bull until his stock have been tested. Several dairy-farmers I know have sold for slaughter bulls which have sired the best stock they ever possessed. I, myself, purchased a four-year-old out of a draught of cattle being sent to the boiling-down works, and this bull left the best milking-stock I ever bred. Especially is this important in the case of pedigree dairy cattle, where the male stock will be worth keeping for breeding purposes. Of course, it will be necessary to have another bull to serve the heifers, but if the old bull has proved himself a good dairy sire—and really good dairy sires are very hard to get—it will pay to keep him, if only to serve a dozen cows.

In the development of the Shorthorn cow it is imperative that the heifer should be done well with her first calf. To bring the heifer in early is essential if the animal energy is to be diverted to milk-production to its utmost extent; but this implies every care being taken, especially in the matter of feeding, to have the heifer in as strong a condition as possible when the first strain of calf-bearing is placed upon her. Especially, too, should she be fed well during her first lactation-period, for the length of this season invariably determines the length of succeeding ones. With the bringing-in of the heifer at an early age it is always advisable to delay the breeding of the second calf, this in order to give her a chance to get in the best condition before another milking season, while it also serves the purpose of encouraging a lengthy first season's milking. The Shorthorn is a fine dairy beast, but it is a beast that must be well treated if it is to give the best returns.

* Three yearlings by Spearmint (the famous English son of the New-Zealand-bred thoroughbred stallion Carbine) realized an average of 2,833 guineas at the recent Doncaster blood-stock sales in England. The record price of the sales was 5,600 guineas for a yearling daughter of Desmond—Sisterlike.



C E. Cuming, photo.]

A Purebred Australian Milking Shorthorn.—Esther, a Member of the Weraroa Shorthorn Herd.

PROFITABLE WALNUT-CULTURE.

A. Bailey Mansfield.

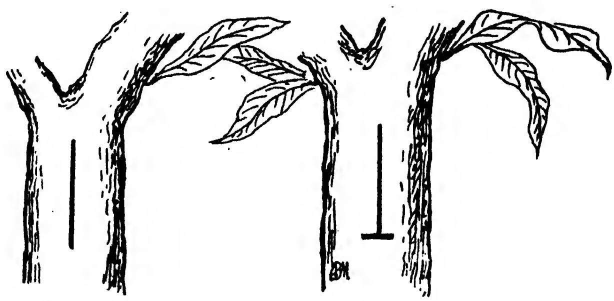
I have been agreeably surprised to note how well the walnut does in South Canterbury. The trees bear heavy crops of nuts with little care or attention. The equable climate and its proximity to the east coast seem to make the district peculiarly adapted for successful walnut-cultivation. The tree is a vigorous grower, and its timber is of great value, being much prized for cabinet-work.

The common walnut (*Juglans regia*) is a native of Persia and the Himalayas, but it is profitably worked in all the southern portions of Europe. Similar to the common walnut is the black-walnut (*J. nigra*) of North America. The latter variety is much valued in California as a stock for growing the selected varieties upon. The fact that the use of the black-walnut as a stock is highly prized is shown in the following remarks received by the writer from Judge S. F. Lieb, of San Jose, California: "Speaking upon the action of stock over scion, I know an English walnut graft on Californian black-walnut loses very much of the little bitter twang which almost every walnut has. I can tell with my eyes shut the taste of a kernel from an English walnut grown upon a Californian black-walnut root, although the two trees may stand side by side."

The walnut requires a coastal climate, as it is found to come earlier into bearing than when planted farther inland. Depth of soil is essential, a rich loamy moist soil being most favoured. It will, however, succeed in deep calcareous loams, and in stiff clays resting on gravelly subsoil. Drainage is most essential for the longevity of the tree. As the walnut-tree attains a great size, sufficient space is necessary to permit of proper development. Not more than twenty-seven trees should be planted to the acre. They require to be planted 40 ft. apart, each way, on the square system. The space between the trees can be cultivated, and peaches may be grown as fillers, or the bush fruits, together with vegetable crops, may also be grown. In California the trees are planted 50 ft. apart in order to prevent crowding. Propagation consists of planting either seedlings or grafted trees. There has been con-

siderable controversy as to the relative merits of both methods. Seedlings are uncertain, as there is the likelihood of the seedling tree not producing the type of nut required. The usual types of grafting apply to working the walnuts as to other fruit-trees. French varieties, when planted as seedlings, follow more closely the type of the parent tree.

In planting walnuts from the nut one may water-soak them to hasten germination. Select good, fresh nuts, place them in a kerosene-tin, and cover them with warm water not over 105° F. Leave them in this water for at least twenty-four hours, and plant them at once. Keep them in the water all the time. Put the pointed end of the walnut in the soil first. The root comes from this end, and will go straight down. This sprouting system does away with the possibility of planting any weak-growing nuts. The nuts should make a sufficiency of growth the first season to enable the grower to bud them in the early autumn. The best method of budding the walnut is by the shield bud. Push the bud into the cut, and not downwards, as is the usual style of budding. The accompanying sketch will show the method.



VERTICAL INCISION. TRANSVERSE INCISION.

Should a sufficiency of growth suitable for budding not be made, one has to have recourse to grafting. By experience the common cleft graft has given the best results. The sketch on the following page will show the method.

Walnuts are best planted at two years old from the nursery, although they can be transplanted at a much later age if care be exercised. The soil should be prepared as for other fruit-trees, or strips only may be ploughed and well cultivated to receive the young trees. The walnut forms its head naturally; thus little pruning is required other than the removal of any straggling branches and for the purpose of preventing the interlacing of limbs. All limbs injured by frost should be removed. The best

time to do any pruning is before the leaves fall, in the autumn. The walnut has separate blooms, staminate and pistillate, but they are both on the same tree. Fruition depends upon these two forms of bloom. The bearing tendency of the walnut depends upon the variety. French varieties bear earlier than others, and are rapidly gaining favour, owing to their being able to withstand cold weather. The seedling walnut rarely comes earlier into bearing than eight years of age. French varieties have been known to bear at two years of age. Scions used in grafting taken from older bearing trees fruit earlier than those taken from young unbearing sorts.

WALNUT GRAFT. (After Wickson.)

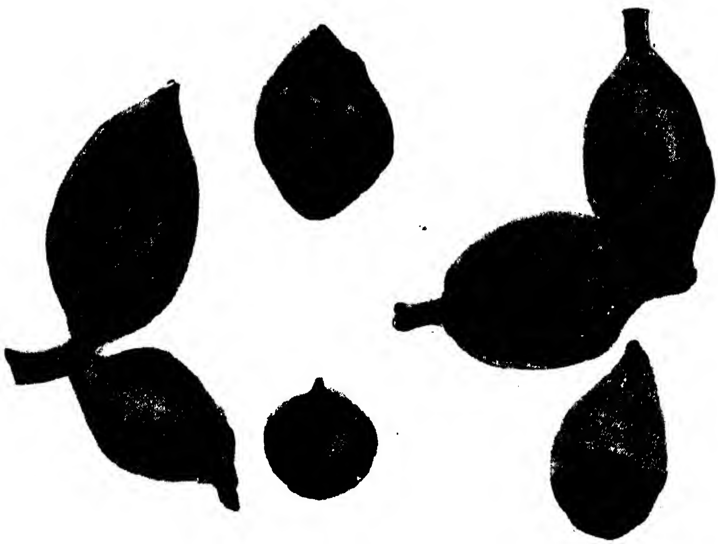
There are two classes of walnuts, the "hard" shell and the "soft" shell. The common English walnut is of the hard-shell variety. Amongst the best soft-shell varieties the following may be cited: Sexton's Soft Shell; Ford's Improved Soft Shell; Mayette, a French variety of soft shell; and Franquette, a French variety of good quality, but the shell is rather thick. The Japanese varieties are of the hard-shell type, but are not favoured for commercial purposes.

In gathering the walnuts some growers gather them off the ground, and in South Canterbury the grass is mown away from the trees with a scythe. This permits of their being easily gathered. Some growers beat the trees with long poles and take all the nuts at the one operation.

All nuts should be well dried by being placed on ¼-in.-mesh trays in the shade. When they have dried, they should be put into a revolving grader with slats 1 in. apart. All the nuts that fall through are classed as "second grade." The nuts are then washed in clean water, being stirred round vigorously the whole time. They should be taken out and placed on the drying-trays, and, while still damp, put into the bleacher. A good bleacher is made out of an old packing-case, if a small airtight shed is not available. Whilst in the trays in the bleaching room or box they are subjected to the fumes of sulphur for from twenty to thirty minutes. This improves the colour of the shells, and also destroys any mildew or fungus spores so detrimental to the kernel

of the nut. The trays should be placed in the sun, so as to allow the nuts to dry. They should then be put into neat, clean bags, containing 56 lb. each. Sew up the bags with good strong twine, and neatly stencil on them the brand, and the name and address, together with the grade, "No. 1" or "No. 2."

The walnuts could also be dipped into a bleaching-solution, which is made by dissolving 6 lb. of chloride of lime in 4 gallons of water. In another vessel dissolve 12 lb. of sal-soda in 4 gallons of water. Pour one solution into the other and stir thoroughly. This gives off chlorine, the bleaching agent. Allow the lime-deposit to settle, draw off the clear fluid, and then add 52 gallons of water.



WALNUTS INFECTED WITH WALNUT-BLIGHT. (After Wickson.)

Add to this mixture 1½ lb. of 50-per-cent. sulphuric acid, mixing thoroughly. Place the nuts in a crate or basket and dip them in and out of the fluid. It should take from eight to ten seconds to get a good colour. The nuts should then be rinsed in clean water and spread out to dry. The same mixture can be used over and over again, so long as the desired effect is secured. From time to time add small quantities of sulphuric acid to make it efficient. By using a spray or dipping-bath of an electrolyed solution of salt a very good colour can be obtained, and the salt is found to act as a preservative, preventing the meat, or kernel, from becoming rancid. The chloride bleacher may enter the stem end of the nut and cause the meat to taste of the chemical.

Walnut-trees make a very desirable wind-break for an orchard, and prove most suitable for shade-trees in the summer for stock. Pigs will feed on the nuts that fall to the ground. They seem to relish them. There is a splendid market for walnuts; the consumption is increasing rapidly, and the nut is much used in confectionery-manufacture. Especially is this the case since the introduction of nut-milk chocolate. The locally raised nuts find a ready market here at 6d. per pound, without being prepared in any manner at all. A lady in the Blenheim district assured me that she could easily dispose of large quantities to the shipping companies for dessert purposes at highly remunerative prices.

The walnut suffers from an attack of scale (*Mytilaspis multipora*). Spraying in the winter, when the tree is dormant, with the red-oil emulsion to 17 gallons of water will be found effective. The walnut-blight (*Pseudomonas juglandis*) is due to a specific bacillus which has so far resisted treatment. The disease affects the young wood and the leaves. It is worse at the blossom end of the nut, and is seen there first, as a rule. In the later stages of the disease the spots run together and cover portion or the whole of the affected area. As the disease spreads the nut degenerates into a rotten mass, and is completely destroyed. In California steps are being taken to plant only those varieties which show immunity to the disease.

CERTIFICATES IN SPRAYING AND PRUNING.

T. W. KIRK, F.L.S.

IN the April issue of the *Journal* it was announced that the Orchards, Gardens, and Apiaries Division had arranged to conduct examinations, both written and practical, of persons desirous of obtaining certificates of competency in the work of spraying and pruning. The names of eight persons who had up to that time secured certificates were given.

That the value of these examinations is being recognized, both by persons possessing small or domestic orchards and by those who desire to undertake the care of such properties, is shown by the fact that this year nineteen candidates were examined. Thirteen passed both practical and written portions of the examination.

To all those whose names follow the certificate (reproduced on this page) has been issued :—

SPRAYING.

Boniface, H. A. J., Ormond, Gisborne.

SPRAYING AND PRUNING.

Hayward, F. H., Kaikoura.
Brown, N. B., Wanganui East.
Brine, J., Wanganui East.
Kalaugher, J. P., Devonport, Auckland.
Thorne, Frederick A., 45 Princess Street, Christchurch.
Harrow, C. C., 71 Middleton Road, Christchurch.
Mackenzie, Thomas, Cromwell.
Strachan, James, Kihikihi.
Berridge, Charles, Tauranga.
Kalashnikov, N., Havelock North.
Shailer, George, Hokowhitu, Palmerston North.
Lambert, A. E., Waimauku.
Cunningham, William, Wai-iti Road, Timaru.
Biggar, W., Hillwood, Whakapuaka.
Smith, R., Motueka, Nelson.
Edwards, A. W., Pigeon Valley, Wakefield.
Mackillop, R., Marton.
Turner, B. T., 34 Broad Street, Woolston.
Bloxham, Albert, Craigalea Farm, Reefton.
Todd, J. H., Little River.

DOMINION OF NEW ZEALAND.

[Ag. O./26.

Department of Agriculture, Industries, and Commerce,

ORCHARDS, GARDENS, AND APIARIES DIVISION.

Departmental Certificate of Competency to Spray or Prune Orchards.

This is to Certify that ....

of ...., has, by passing a theoretical and practical examination, demonstrated his ability to carry out the following operations:—

THE SPRAYING OF ORCHARDS; THE PRUNING OF ORCHARDS.

Dated at Wellington, this .... day of ...., 191....

Signature: ....
Designation: .... Examiners.
Signature: ....
Designation: ....

....
Director of Division.

850/10/13—16905]

MEADOW-FOXTAIL.

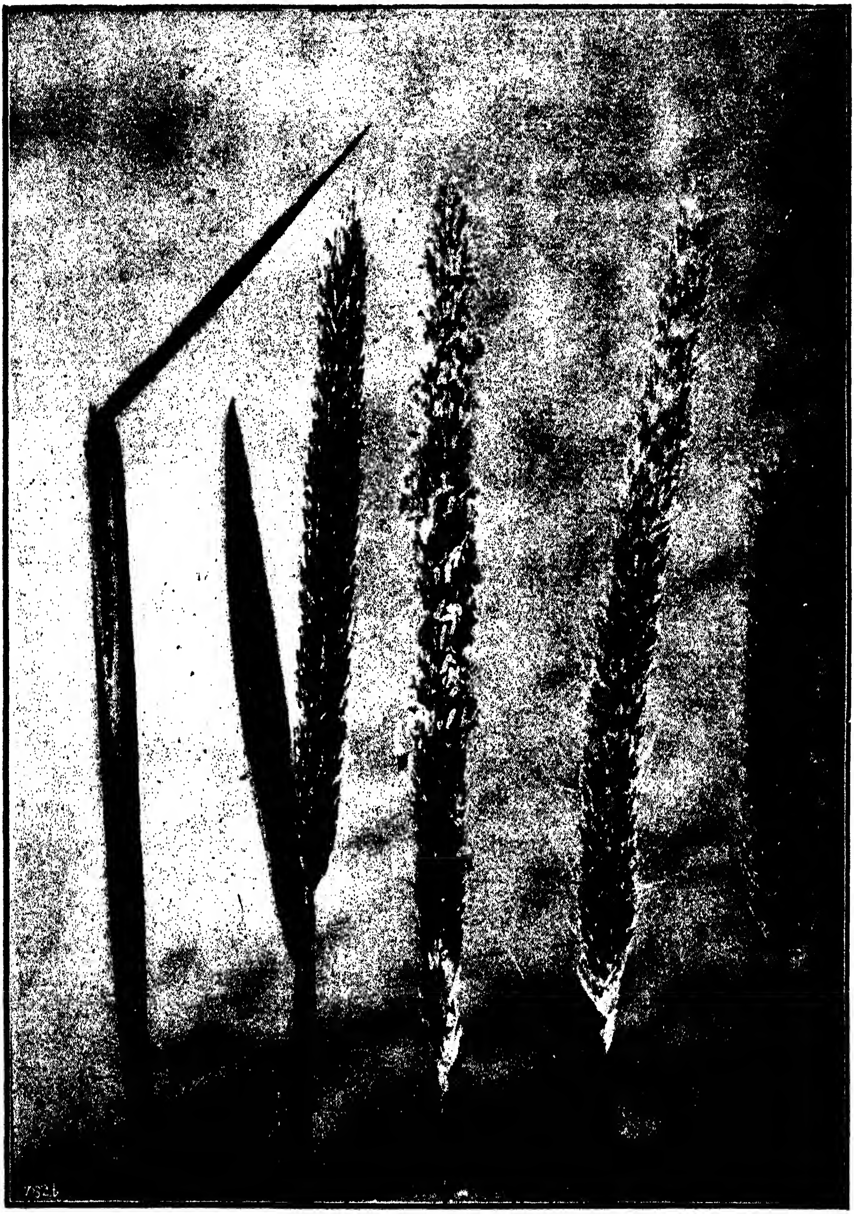
A VALUABLE PERMANENT PASTURE-GRASS.

A. H. COCKAYNE.

A NOTABLE feature of the sown-grass lands of New Zealand is the very large proportion that is devoted to permanent pasture. This being the case, it is peculiar that many of the truly permanent grasses are not used to anything like the extent that their value warrants. Especially is this true of meadow-foxtail (*Alopecurus pratensis*), which is rightly considered one of the most valuable of all permanent grasses on soils where its growth is satisfactory. In Europe, especially in the famous pastures of the Netherlands and Denmark, meadow-foxtail is often dominant, and is amongst the most esteemed and valuable of grasses. In New Zealand, although during the past few years its use has been extending, it is even now frequently omitted from mixtures for soils that would be eminently suitable for its development. Even when included the quantity employed is often too small to have any really appreciable effect. In many cases meadow-foxtail is not employed owing to its expense, the price varying from 1s. to 2s. per pound. But the additional cost of a few shillings per acre in the efficient laying-down of permanent pasture is money well spent. In temporary pastures, where the whole cost of formation has to be recovered within a season or two, the advisability of using expensive varieties of grasses and clovers is questionable. In pastures of long duration the expenses can be looked upon as permanent improvement. Cost should, therefore, be a secondary matter in comparison with the choice of the most suitable varieties and the employment of high-grade seed.

Meadow-foxtail is a true perennial, and is provided with short underground stems which give off upright shoots well clothed with broad leaves. In this characteristic it resembles fiorin and *Poa pratensis*, but the underground stems are much less developed than in the last-named species.

Until quite recently meadow-foxtail was thought to be of value only on very heavy soils and well-drained swamp lands, but it has been shown to be an excellent and permanent grass on many soils provided the rainfall be abundant. On heavy land it is, of course,



E. B. Levy, photo.]

SEED-HEADS OF MEADOW-FOXTAIL IN VARIOUS STAGES OF DEVELOPMENT.

easily the best of all grasses for permanent pastures. Such land is, however, often required for temporary pasture, and its use on such soils is not always a good policy, as foxtail does not develop its full growth for several seasons. It is also difficult to destroy, owing to its underground stems; and after breaking up requires a season's fallowing and cultivation. On swampy lands which are liable to occasional temporary flooding, and on much of our better-class burnt-bush country, especially that on "papa" formation, foxtail should occupy an important place.

Over a hundred years ago an agricultural writer described foxtail as possessing the three great characteristics of "quality, quantity, and earliness." These terms so aptly describe this grass that hardly anything further need be added in its praise. In New Zealand, more especially in the North Island, it has hardly any period of rest, and even in cold winters its yield during the autumn and winter is more satisfactory than that of the majority of our permanent grasses. Its underground stems help to make pastures largely composed of foxtail to become quite closed, and prevent invasion by undesirable plants during that period when the temporary grasses that have been sown are thinning out.

SEEDING.

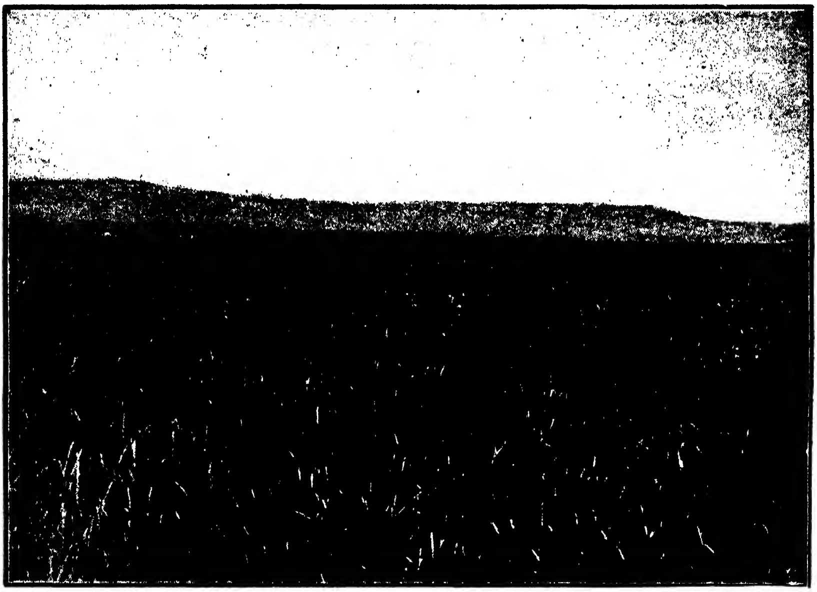
Foxtail cannot be drilled in, and has always to be sown by hand. On this account its use on ploughed land is not popular. It should be sown after the ground has been rolled with a Cambridge roller, and at right angles with the wind. In this way much the same effect as if the seed has been drilled is obtained. The ground should then be brush-harrowed and rolled if the seeding is in the spring, but if autumn-sown the final rolling can be profitably dispensed with.

The following mixture is suggested for heavy drained swamp land: Foxtail, 12 lb.; *Poa trivialis*, 2 lb.; timothy, 8 lb.; white clover, 2½ lb.; alsyke, 2½ lb.; Italian rye, 6 lb.

On burnt-bush country, where the conditions are suitable, up to 5 lb. of foxtail per acre, in conjunction with the other grasses sown, would prove profitable. At present 1 lb. per acre is about the amount that is used, but when such a small quantity is used it will be many years before the grass will occupy an appreciable position in the pasture. When grown specially for seed-production about 20 lb. of seed should be used per acre. It must be remembered that the use of high-grade seed is presupposed, and where this is not the case the quantities will have to be augmented in proportion to the quality of the seed.

Foxtail-seed.

The production of foxtail-seed is often highly remunerative, as much as £16 per acre having been secured in New Zealand. It is, however, one of the most difficult of all grass-seeds to harvest, and at times the amount of seed produced is extremely disappointing. The great difficulty is due to the seed-heads ripening very irregularly, and also to the seeds on the individual heads not all being ripe at the same time. The crop should be heavily grazed until about the first week in October, and should then be shut up. In dry seasons it may be advisable to close up a week or so earlier,



E. B. Levy, photo.]
Meadow-foxtail Field in the Foxton District.

but the great mistake that is almost invariably made is to shut up the crop too early in the year. When this is done the amount of herbage produced is often so great that the crop lodges badly, and much of the seed is ruined. The exact time to cut varies considerably, but as soon as the majority of the stalks have turned yellow for about 1½ in. below the seed-head cutting should be commenced.

Adulteration and Impurities.

It is customary for agricultural text-books to enlarge considerably upon the adulteration with Yorkshire fog, rye-grass, and hair-grass that is likely to occur in foxtail samples. So far as the seed that has been examined in the Department's laboratory at

Wellington is concerned, none of the samples could be looked upon as having been deliberately adulterated. One sample recently analysed contained over 15 per cent. of Yorkshire fog, which may perhaps have been intentionally added. Yorkshire fog is, however, frequently present in considerable amounts in foxtail pasture which has not been laid down many years. In old foxtail pasture the amount of fog is generally almost nil, and the fact that over 70 per cent. of the samples examined did not contain any fog shows that this grass is not by any means a general impurity. Rye-grass is said to be mixed frequently with foxtail to increase the bushel-weight, but such a practice has not come under my notice.

Foxtail-seed is very difficult to clean, and samples frequently contain a very large number of extraneous seeds both in species and numbers. In certain cases 20 or more per cent. may consist of impurities. In general, however, the majority consist of grasses which are useful in permanent pastures, such as *Poa pratensis* and *Poa trivialis*. The large number of impurities that are likely to be met with in foxtail-seed renders the determination of its purity of great necessity, and the farmer should never neglect taking this precaution when buying seed. Californian-thistle seed is not found in foxtail samples, as this grass is invariably harvested before any thistle-seed has ripened. The early harvesting of foxtail is frequently responsible for the immaturity of many of the extraneous seeds, notably those of *Aira* and *Festuca*.

During the past two years thirty-five lines of foxtail, mostly of Dutch and Danish origin, have been analysed for purity, and seventy-one species of extraneous seeds have been noted. The following list gives names and frequency of occurrence of the main species:—

	Number of Samples in which occurring.
1. Fine-leaved fescues (mainly *Festuca rubra* and *ovina*) ..	25
2. Smooth-stalked meadow-grass (*Poa pratensis*)	25
3. Tufted hair-grass (*Aira caespitosa*)	21
4. Wild beaked parsley (*Anthriscus silvestris*)	16
5. Common caraway (*Carum carvi*)	16
6. Creeping buttercup (*Ranunculus repens*)	15
7. Cocksfoot (*Dactylis glomerata*)	14
8. Perennial rye-grass (*Lolium perenne*)	13
9. Timothy (*Phleum pratense*)	12
10. Sour dock (*Rumex acetosa*)	12
11. Rough-stalked meadow-grass (*Poa trivialis*)	11
12. Tall buttercup (*Ranunculus acris*)	11
13. Tall fescue (*Festuca elatior*)	10
14. Wild oat (*Avena fatua*)	8
15. Yorkshire fog (*Holcus lanatus*)	8
16. Buttercup (*Ranunculus* sp.)	8
17. Sorrel (*Rumex acetosella*)	7
18. Meadow-fescue (*Festuca pratensis*)	7
19. Spurrey (*Spergula arvensis*)	6
20. Goose-grass (*Bromus hordeaceus*)	5
21. Wood-rush (*Luzula campestris*)	4

	Number of Samples in which occurring.
22. Dock (*Rumex* sp.)	4
23. Oats (*Avena sativa*)	3
24. Sweet vernal (*Anthoxanthum odoratum*)	3
25. Wind-grass (*Agrostis spica-venti*)	3
26. Crested dogstail (*Cynosurus cristatus*)	3
27. Small canary-grass (*Phalaris minor*)	3
28. Wild parsley (*Petroselinum sativum*)	3
29. Twitch-grass (*Agropyron repens*)	2
30. Knee-jointed foxtail (*Alopecurus geniculatus*)	2
31. Narrow-leaved hawksbeard (*Crepis tectorum*)	2
32. Treacle-mustard (*Erysimum* sp.)	2
33. Floating-grass (*Glyceria* sp.)	2
34. Hemp-nettle (*Galeopsis* sp.)	2
35. Toad-rush (*Juncus* sp.)	2
36. Rib-grass (*Plantago lanceolata*)	2
37. Italian rye-grass (*Lolium italicum*)	2
38. Prickly sowthistle (*Sonchus asper*)	2
39. Sowthistle (*Sonchus oleraceus*)	1
40. Meadow oat-grass (*Avena pratensis*)	1
41. Wavy hair-grass (*Aira flexuosa*)	1
42. Hairy oat-grass (*Avena pubescens*)	1
43. Larger mousear chickweed (*Cerastium vulgatum*)	1
44. Ox-eye daisy (*Chrysanthemum leucanthemum*)	1
45. Fat-hen (*Chenopodium album*)	1
46. Sedge (*Carex* sp.)	1
47. Hair-grass (*Festuca bromoides*)	1
48. Clearers (*Galium Aparine*)	1
49. Cut-leaved cranesbill (*Geranium dissectum*)	1
50. Hawkweed (*Hieraceum* sp.)	1
51. Creeping Yorkshire fog (*Holcus mollis*)	1
52. Birdsfoot trefoil (*Lotus corniculatus*)	1
53. Linseed (*Linum usitatissimum*)	1
54. Scentless mayweed (*Matricaria inodora*)	1
55. Canary-grass (*Phalaris canariensis*)	1
56. Pale persicaria (*Polygonum lapathifolium*)	1
57. Field-birdweed (*Polygonum Convolvulus*)	1
58. Wood meadow-grass (*Poa nemoralis*)	1
59. Small-flowered buttercup (*Ranunculus parviflorus*)	1
60. Chickweed (*Stellaria media*)	1
61. Catchfly (*Silene* sp.)	1
62. Salsify (*Tragopogon porrifolius*)	1
63. Suckling-clover (*Trifolium minus*)	1
64. Penny-cress (*Thlaspi arvense*)	1
65. Dandelion (*Taraxacum officinale*)	1
66. Alsike (*Trifolium hybridum*)	1
67. White clover (*Trifolium repens*)	1
68. Red clover (*Trifolium pratense*)	1

GERMINATION AND BUSHEL-WEIGHT.

The germination of foxtail is often extremely bad. This is due to the irregular ripening of both the individual seeds in the seed-head and also of the seed-heads themselves. As has been mentioned, a good deal of the irregularity of the ripening of the individual seed-heads can be more or less obviated by thorough grazing before the pasture is shut up for feed. Efficient machine-dressing removes a large percentage of the light chaffy glumes that are devoid of kernels, but as this process causes a great deal of loss in weight, it is not generally carried out with sufficient thoroughness to produce a high germinating line. During the past two years

115 samples have been tested for germination, the maximum being 87 per cent. and the minimum 8 per cent.

1	sample germinated less than		10 per cent.			
4	samples germinated	between	11	and	20	per cent.
13	,,	,,	21	,,	30	,,
11	,,	,,	31	,,	40	,,
18	,,	,,	41	,,	50	,,
27	,,	,,	51	,,	60	,,
29	,,	,,	61	,,	70	,,
8	,,	,,	71	,,	80	,,
4	,,	,,	81	,,	90	,,
0	,,	,,	91	,,	100	,,

In the germination tests conducted here the Irish seed-testing system of using all the seeds irrespective of whether they contain mature kernels or not has been adopted. It is considered more satisfactory to determine the germination on bulk rather than on selected seeds, such as is done by many of the European seed-control stations. Thus the germinations given above represent the actual germination per 100 of the seeds irrespective of whether they are properly matured or not.

Bushel-weight is of great importance in the rapid determination of the value of different lines, as the lighter the bushel-weight the larger is the percentage of immature and chaffy seeds. Some samples may weigh as little as 5 lb. per bushel, while real high-grade ones may go as high as 12 lb. to 14 lb. As a general rule a weight of 9 lb. and over per bushel may be looked upon as good. The individual weight of 1,000 seeds is also of great assistance in determining the value of samples. Lines that weigh less than 0·5 grams per 1,000 should always be rejected, as they consist very largely of chaff and are of extremely low germination. Good germinating lines frequently weigh nearly 1 gram per 1,000. The number of seeds per pound thus varies considerably from about 500,000 for real good samples to over 1,000,000 in inferior lines. In all cases the smaller the number of seeds per pound the more valuable is the sample. A great deal of the dissatisfaction that has arisen through the use of foxtail is due to the using of inferior low-germinating seed. The determination of purity and germination is more necessary with foxtail than with almost any other seed that is employed in pasture-formation. The fact that foxtail is amongst the most highly priced of our grass-seeds emphasizes the necessity for a thorough determination of its quality, and until this has been done the farmer cannot possibly tell how much seed per acre it is necessary to use in order to secure a satisfactory result.

SEMI-OFFICIAL TESTING.

STATEMENT TO THE 28TH NOVEMBER, 1913.

W. M. Singleton.

The following list of cows which have qualified for semi-official record represents the yearly records of twenty-one Jersey and eighteen Holstein-Friesian cows, giving, together with those semi-official records published in the September and October numbers of the *Journal*, a total of 108 purebred cows which have already completely qualified. This qualification includes not only the production of the minimum fat requirement, but also the dropping of a calf within fifteen months after the commencement of the test. We should have had additional records for publication had not a number of cows which were on test and which produced the minimum fat requirement failed as regards the subsequent calving.

It will be noted that many of the cows that have qualified are of immature age. For each year a heifer is under the age of five years down to two years her butter-fat requirement is 36·5 lb. less per year than her requirement as a five-year-old. The minimum butter-fat requirement for a cow five years old or over is 350 lb. When the age and production of some of these young cows is considered it will be seen that the present records suggest that many of them will at the prime of life produce records exceeding 400 lb. and 500 lb. of butter-fat.

Despite the fairly large percentage of immature cows included in this list and in the other two lists which have been published, there are now on semi-official record in New Zealand the productions of forty-four cows with yields exceeding 400 lb. of butter-fat. These records, together with those of the heifers, which are at least equal to this production as mature cows, are a nice little nucleus of the splendid number of records which will be extant in New Zealand within the next few years.

Even now fanciers of Jerseys and Holsteins can procure to a limited degree bulls with a butter-fat record backing. The records made by animals in semi-official test give a standing to

C. E. Cuming, photo.]

MR. J. C. N. GRIGG'S HOLSTEIN COW, LONGBEACH NETHERLAND QUEEN VII.

This cow headed the list in the semi-official work last season. She died after the last calving. Photograph taken when Longbeach Netherland Queen VII was dry.

all their previous progeny, and in the future these will be held in higher esteem.

Of the 600,000-odd dairy cows in this country, it is estimated that scarcely 5 per cent. are mated with purebred dairy bulls. The field for breeders of purebred dairy stock of the best producing strains must be unlimited for many years. The cow-testing association is the most potent influence in operation in New Zealand in educating the dairyman towards a proper appreciation of the necessity of heading his herd with a purebred dairy bull. The semi-official records of purebred dairy cows give the average dairyman confidence in investing in purebred dairy sires; and breeders should also use their best endeavours to get cow-testing associations into operation in their districts. The primary effect of cow-testing is its benefit to the dairy-farmer, but at the same time it assists in providing extended markets for the breeder.

Name of Cow.	Name and Address of Owner.	Age at Starting Test.	Yield for Season. Days.	Milk.	Fat.
	JERSEYS.	Yrs. days.		lb.	lb.
Lady of Collingwood ..	F. E. Hellyer, Dunedin	1 357	365	8,426·75	524·29
Mamy I	E. Griffiths, New Plymouth ..	12 359	359	9,710·00	514·12
White Patch ..	A. H. Halcombe, Urenui	9 41	318	9,144·50	449·20
Sweet Marie	R. J. Linn, Normanby	5 14	343	8,253·60	444·91
Dusky Girl	S. R. Lancaster, Palmerston North	3 3	342	10,041·50	427·36
Zephyr	W. V. Harkness, Tariki	8 8	257	7,156·00	417·94
Zillah	" "	5 349	295	7,038·50	415·86
Zest	" "	3 246	264	7,264·00	413·20
May Dream	" "	3 179	316	6,588·00	404·88
Gloria	" "	3 352	295	6,964·00	403·90
Fuchsia	" "	4 227	311	6,757·50	402·15
Genoa Maid	W. J. Hall, Matatoki	4 310	365	7,397·65	399·04
Queenie Lass ..	R. J. Linn, Normanby	3 342	272	6,705·00	381·71
Mabel of Concord ..	W. J. Hall, Matatoki	5 5	365	7,140·80	380·16
Sunrise	J. D. Brown, Ihakara	4 340	309	7,569·75	378·57
Milkmaid III ..	E. S. Holdaway, Ballance ..	3 163	363	6,287·40	367·92
May Day	W. V. Harkness, Tariki	6 149	289	6,553·00	357·65
Bustle's Pride ..	" "	4 342	307	5,870·50	352·69
Senorita	A. Buchanan, Palmerston North ..	3 322	347	5,720·55	338·50
Wee Daisy	A. and J. O'Donnell, Inaha ..	3 66	327	5,743·50	303·36
Connemara	" " ..	2 332	294	5,273·00	293·25
	HOLSTEINS.				
Longbeach Netherland Queen VII	J. C. N. Grigg, Longbeach ..	9–10 yrs.	363	16,234·50	659·31
Manola	Weraroa Experimental Farm ..	Not known	359	20,717·25	584·49
Tui de Kol	G. Aitchison, Kaitangata	3 102	337	16,277·00	559·43
Glendowie Flora ..	C. C. Buckland, Cambridge ..	About 6 yrs.	364	10,413·10	452·94
Mary	Weraroa Experimental Farm ..	Not known	283	11,232·50	442·06
Longbeach Moss Rose ..	J. C. N. Grigg, Longbeach ..	7–8 yrs.	286	11,768·75	432·46
Netherland Princess IV	John Donald, Westmere	1 352	343	10,572·50	430·82
Longbeach Magpie I ..	J. C. N. Grigg, Longbeach ..	8–9 yrs.	314	12,941·50	414·36
Netherland Pauline ..	John Donald, Westmere	3 107	322	10,520·50	380·41
Mutual Mercedes of Rock	Weraroa Experimental Farm ..	2 10	364	11,653·80	374·86
Glendowie Bonny ..	C. C. Buckland, Monavale ..	Not known	364	11,886·70	371·99
Domino Pride ..	Weraroa Experimental Farm ..	1 364	364	10,129·00	370·33
Glendowie Hetty ..	C. C. Buckland, Monavale ..	Not known	363	10,717·35	357·46
Countess of Longbeach	W. I. Lovelock, Palmerston North	4 9	363	9,155·50	351·75
Manor de Kol Lady ..	" "	4 19	296	9,642·00	350·19
Lunta XIII of Brundee	Rev. Jos. Clark, Hamilton ..	3 362	322	10,343·50	348·65
Mokau	J. Pirie, Woodlands	2 337	359	10,258·40	332·07
Miss Wood	M. Leith, Woodlands	2 32	326	9,016·40	316·19

EXPORT OF FRUIT.

T. W. KIRK, F.L.S.

GUARANTEE ON TRIAL SHIPMENTS OF APPLES AND PEARS MADE TO EUROPEAN AND NORTH AMERICAN MARKETS.

THE Government has decided to offer to exporters of apples and pears to Europe and North America during the coming season a guarantee against possible loss. The terms of the offer are,—

1. The guarantee shall be 1d. per pound net on all apples and pears accepted by the Inspector.

2. (*a*.) The varieties of apples shall be—Ribston Pippin, Cox's Orange Pippin, Wellington Pippin, New York Pippin, London Pippin (Five Crown), Rymer, Esopus Spitzenberg, Delicious, Scarlet Nonpareil, Monroe's Favourite, Cleopatra, Jonathan, Adams's Pearmain, Sturmer, and such other *dessert* varieties as are approved by the Inspector.

(*b*.) The varieties of pears shall be—Beurre Easter, Beurre Bosc, Beurre Diel, Beurre d'Anjou, Beurre Clairgeau, Doyenne du Comice, Josephine de Malines, L'Inconnue, P. Barry, Vicar of Winkfield, Winter Cole, Winter Nelis, and such other *dessert* varieties as are approved by the Inspector.

3. They shall be entirely free from insect pests, fungus diseases, or blemishes.

4. Apples shall be packed in the standard case adopted by the Hawke's Bay and Motueka Conference—viz., 18 in. by 14¼ in. by 8¾ in., inside measurement—or in the new case recommended by the Department—viz., 10 in. by 11¼ in. by 19¾ in., inside measurement. Thickness of timber: Heads, ¾ in.; sides, tops, and bottoms, $\frac{5}{16}$ in.

5. Pears shall be packed in single trays (holding one tier), the dimensions of which are 2½ in. by 11¼ in. by 19¾ in., inside measurement—three trays to be cleated together making one case; or in the new half-case recommended by the Department, holding two tiers, inside measurement of case being 5 in. by 11¼ in. by 19¾ in.

6. All cases shall be new, and legibly branded—

NEW ZEALAND APPLES.
One Bushel.

Grade: Special.
Choice. No. of Apples: ......
Good.
[*As the case may be.*]

Pears ditto.

"Special" grade shall consist of fruit free from disease and blemish, and exceptionally well coloured of its variety, and specially graded and packed.

"Choice" grade shall be free from disease and blemishes, but not so well coloured as "special."

"Good" grade shall be free from disease, and not more than 5 per cent. of blemish.

Together with such other particulars as the shipper desires. Shippers are, however, reminded that a simple brand is preferable.

7. They shall be graded and packed to the satisfaction of the Inspector.

8. The size of apples shall be 2½ in., 2¾ in., 3 in., 3¼ in., 3½ in. (Nothing under or over these sizes will be accepted.)

Red varieties of apples: Early shipments must show at least 65 per cent. of good colour; later shipments at least 75 per cent. Striped varieties of apples: Early shipments at least 40 per cent. good colour; later shipments at least 50 per cent.

9. All consignments shall be shipped in cool storage.

10. Shippers shall make their own arrangements for shipment and for sale in Europe and North America.

11. The High Commissioner's offices and the New Zealand Government Agent in America shall be given facilities for inspecting and reporting on the fruit after arrival, and on the sale thereof.

12. In calculating the amount to be deducted for expenses, New Zealand freights and wharf charges shall be taken into consideration, but the cost of the case, labour, and packing shall not be taken into account.

13. Shippers shall see that the labour necessary for handling the fruit, and for opening and closing cases for inspection, is provided.

14. All cases accepted for shipment under this guarantee will be branded by the Inspectors. Fruit passed for export but not under this guarantee will be certified, but not branded.

GUARANTEE ON TRIAL SHIPMENTS OF PEACHES MADE TO THE WEST COAST OF NORTH AMERICA.

A guarantee of 1d. per pound net return on shipments of peaches made during the coming season to the west coast of North America is also offered, the maximum amount payable being £150, and subject also to the following conditions:—

1. That at least two shipments go forward, each consisting of not less than 250 cases.

2. That the fruit must be entirely free from disease.

3. That the peaches be packed in the single trays (holding one tier), the dimensions of which are 2½ in. by 11¼ in. by 19¾ in. inside measurement, three trays to be cleated together to make one case; or in the half-case, recommended by the Department, holding two tiers, inside measurement of case being 5 in. by 11¼ in. by 19¾ in. Fruit must be selected, packed, and graded to the satisfaction of the Government Inspector.

4. That the shippers make their own shipping arrangements, and that facilities be given for inspection by the New Zealand Government Agent on arrival in America.

5. That only such varieties be sent as are approved by the Government Inspectors.

6. Any case or cases rejected by the Inspector must be regraded and packed to his satisfaction, or withdrawn from the shipment.

7. Fruit must be shipped in cool storage.

NEW ZEALAND HONEY ON THE HOME MARKET.

Particulars have been received from the High Commissioner, London, of the prices realized by recent shipments of New Zealand honey exported to England and Scotland.

A consignment of 100 cases from Canterbury arrived at Liverpool on the 26th June last. This honey was consigned to Messrs. Henry Williams and Co., of Liverpool, per s.s. "Essex." The cases landed in excellent order and condition. They were clean and well made, and, being iron-bound at the ends, were quite strong. In two or three instances the contents had slightly run, but not to such an extent as seriously to affect the appearance of the cases. This had evidently been caused by the honey having been stowed against the engine-room bulkhead. In another instance a case had evidently received a heavy jar on the top side.

This seemed to have caused the lid of one of the tins to spring party open, and in consequence a slight leakage of the honey had taken place. In all the other boxes opened the honey was firm-set, and the colour was favourably commented upon. The packing was in every way good, and the tins were clean and bright, and fitted into the boxes quite tightly. It is suggested, however, that if screw-tops were fitted to the tins, as in the case of Californian consignments, and the lids screwed in, this might be considered an improvement on the present canister lid, which is simply pressed into place over parchment paper; a heavy jar on the box or tin might conceivably jerk the canister lid out of place altogether. The whole of this consignment was disposed of at the very satisfactory figure of 45s. per cwt. Another line of forty cases also arrived per s.s. "Essex" consigned to Messrs. Berry, Barclay, and Co., Leith, Scotland. Both tins and cases were entirely satisfactory. There was no breakage or leakage. The quality of the honey was very fine, being first-class clover honey with good delicate flavour. The price at which the consignment was sold was 4d. per pound net ex store Glasgow. This is 37s. 4d. per cwt., and for honey of such fine quality the price appears to be low. The shippers should, however, take into consideration that this was a trial shipment and the first that has been placed in this condition in Scotland. It may perhaps be of interest to producers to record that this shipment was consigned to a firm of grain-merchants, and not to a house accustomed to handling honey and having connections with purchasers of that class of produce. On account of this the best returns possibly may not be received, and thus lead to disappointment. Both consignments referred to above were graded before shipment from New Zealand by the Department's officers. In London Messrs. Lewis and Peat have been getting good prices, and they consider that the market is firm, and that later shipments will be easily sold, probably at advanced prices. Seventy-nine cases ex "Athenic," which arrived on the 7th March from Christchurch, sold up to 42s. 6d. per cwt., the quality being described as set pale amber to set pale, fairly smooth consistency. Thirty-three cases ex "Orari," which reached here on the 10th April from Auckland, realized 37s. 6d. per cwt. The quality was set grainy amber. Both these lines were consigned to Messrs. Dalgety and Co. 130 cases from the Waikato district were sold by public auction at the London Commercial Salerooms, Mincing Lane, on the 10th July. The average price realized was 42s. 3d. per cwt., the lowest price being 33s. per cwt. and the highest 46s. 6d. per cwt. Market conditions at the time were very good, and the result, it will be conceded, was a very favourable one from all points of view. A further consignment from the Waikato district was also sold in London on the 24th August, twelve cases realizing 37s. 6d. per cwt., and twenty-eight cases at 43s. 6d. per cwt. Samples of the latter received in the Produce Department were of very good quality and flavour, but the brokers did not consider the colour quite equal to that of the previous consignment. The Produce Department of the High Commissioner's Office is keeping in close touch with the honey-market at Home, and from what can be gathered the general opinion is that the market for honey at the present time is distinctly good. In Liverpool Californian has been selling at from 40s. to 47s. 6d., Jamaican up to 35s., and Chilian up to 37s. 6d. for the better qualities, though the poorer sorts have been down to 25s. and 28s. 6d. per cwt. It is understood, too, that there is a scarcity of the better-class Californian honey, and a shortage also from Jamaica on account of the hurricane experienced there some time ago. These factors combine to keep the market firm and steady, and with a good demand from buyers prices have been very satisfactory.

HOP PROSPECTS.

THE High Commissioner, writing under date of the 10th October last, reports as follows:—

The close of the hop-picking season in this country affords a favourable opportunity of reviewing the figures in regard to the world's crops, and of estimating the prospects of the market for hops for the next few months. The Board of Agriculture have recently published information in regard to Continental crops, supplied to them by H.M. Consuls abroad, and the big hop-merchants at Home have issued their reports in regard to Home production, so that fairly reliable forecasts can now be arrived at as to future trade prospects. It is generally conceded that the English

crop will fall very short of last year's total, for which several reasons are given. Severe attacks of aphis blight were experienced all round early in the season, and in spite of spraying, &c., there are many gardens where the blight got the better of the growing plants. Consequently the yield in those districts has turned out to be very small indeed. Then again, towards the latter end of July and the beginning of August low temperatures were experienced, which had the effect of checking growth. From the middle of August, however, a higher temperature was enjoyed, and this, together with a copious rainfall, considerably improved the situation: indeed, opinions were generally expressed that the quality of the crop would be better than had been known for some years, though the yield would be from 50,000 cwt. to 80,000 cwt. short of 1912 figures. Speaking at a meeting of the East Kent Chamber of Agriculture recently, Mr. E. Le May (one of the best-known hop-merchants in the borough) confirmed the growers' reports that the crop was coming down one-third less than the estimates. In some of the bad districts of Kent and Sussex the yield had proved to be not more than a quarter of last season's. In the best districts crops were very light, and he thought that in Worcester the yield would not be more than 4½ cwt. per acre.

These results would seem to indicate that Home supplies will only provide about half the annual consumption, and, that being so, consumers are naturally anxious to know where the other half is to come from. All estimates of Continental crops point to a big decrease in yield, and private growers who have visited the Continent testify to the correctness of these statements. In September Consular reports stated that in the whole of Germany it was expected that the yield would be about 300,000 cwt., or about three-fourths of that of last year. In Bohemia the yield was anticipated to show a considerable decrease, and for the whole of Austria-Hungary the yield is likely to be about 225,000 cwt., as compared with 443,000 cwt. last year. Taking the two countries together, therefore, the figures show a shortage of 318,000 cwt., so that exports from the Continent will doubtless be very small. The yield in Belgium was estimated to be of good average, both in quantity and quality, and 50,000 cwt. was given as the likely figure. Most of the Belgium hop trade is done with Germany. Last year 120,000 cwt. was imported into this country from the Continent.

In America the crop was expected to be slightly heavier, the States of Oregon and Washington showing increases and California a slight decrease, the total yield for 1913 being estimated at about 497,000 cwt., as against 479,000 cwt. in 1912. The United States sent us 96,000 cwt. last year, which total included a fair quantity of old hops. As it is known that their stock of old hops is now practically exhausted, it is thought that country will not be able to export to the United Kingdom a very much larger quantity than was the case last year. Reckoning, therefore, that the total likely importations will amount to 150,000 cwt., and adding the Home crop total, we get a total of about 500,000 cwt. As our requirements are about 600,000 cwt., the balance of 100,000 cwt. will have to be made up from old stocks. According to all accounts all the 1909, 1910, and 1911 stocks have been used up, so that the shortage will have to come out of the 1912 supply.

On all sides, therefore, the future position is regarded as a very strong one. The markets recently have ruled very firm at prices between £9 and £10 per hundredweight for first-quality hops. Growers in the Dominion, therefore, can look with confidence to a good demand for any parcels they may send forward, and there is no doubt that prices will be on a remunerative basis.

In the orchard at the Ruakura Farm of Instruction the effect of clean cultivation throughout the last two summers is now apparent. There is at present little difficulty in keeping weeds under control. It can be noticed this season that the bronze beetle is entirely absent in the centre of the orchard, only the first and second rows of trees along the headlands being attacked. Just at dusk swarms of beetles can be seen flying over the hedges from neighbouring grass-fields. This leads one to believe that freedom from attack must be due to absence of grass and weeds under the trees.—*A. W. Green.*

AGRICULTURE ABROAD.

THE PRESENT STATE OF THE QUESTION OF INBREEDING IN GERMANY.

Dr. H. KRAEMER, Professor at the Agricultural College of Hohenheim, in a Bulletin of the *International Institute of Agriculture.*

THE term "inbreeding" (*Inzucht*) was formerly frequently used to mean breeding of pure races (*Reinzucht* or *Rassenzucht*), whilst to-day it is limited to the persistent pairing of nearly related individuals. And while a further extended inbreeding ends in becoming a simple breeding of a pure race, still it is always desirable for the greater clearness of the whole question that under the term "inbreeding" the blood relationship be clearly understood. For consanguineous breeding in the narrowest sense the German breeders continue to use the term "incest" (*Inzest*).

According to passages of Aristotle and Ovid it appears that the ancients did not scruple to practise the closest consanguineous unions. From the middle ages but few documents have come down to us containing the views of breeders on the subject; and while some writers recommend inbreeding, others pronounce against it. In horse-breeding it may often have been employed according to a well-thought-out plan, but in general the conditions of the Middle Ages were not adapted to the application of carefully studied principles. The frequent cases of inbreeding occurred without any system being followed, out of sheer ignorance of its dangers, or of indifference, and also from the impossibility of changing certain conditions.

In England, as is well known, systematic inbreeding was largely used with the object of forming improved breeds endowed with certain qualities; but it would be an error to believe that in England the system had no opponents or that it was always attended with success. Notwithstanding the greater experience of English breeders and the extension of pastures favoured by the climate, there has been no lack of warnings raised in England against the evil consequences of inbreeding. And while, for instance, Culley was convinced of the innocuity of properly conducted inbreeding, John Sinclair, Prinsep, Sebright, and others insisted that continued inbreeding would be followed by debility, disease, and sterility.

In France, also, the chief breeders have expressed their opinion on the question. Sanson recognizes in inbreeding a powerful means of improvement. Cornevin communicates a whole series of facts of his own experience, and in the main is not inclined to take the dangers of inbreeding too seriously. On the other hand, Baron believes that a too-long-continued use of close breeding leads to sterility. On the whole the opinions of the leading men in France seem to differ quite as much as they do in Germany. At present, however, there is no doubt that in the matter of thorough research for the elucidation of the question the greatest progress has been achieved in Germany.

It is beyond discussion that in the old times of German stock-breeding inbreeding was not at all discountenanced. The former tendency laid great stress on complete purity of breed and looked askance at crossing. In such a state of affairs frequent inbreeding was the result, and it was approved of even among the nearest relations (*Inzest*), provided it was practised among perfectly sound animals. Owing to the partially very good results obtained by crossing with English blood, the theories of pure breeding and of constancy were shaken, and inbreeding, which was one of the main points of the programme, fell into undeserved discredit. Stress was laid upon the unsuccessful results which inevitably follow on haphazard inbreeding, and which in Germany were all the more to be expected, as almost everywhere stall-keeping prevails and the interests of agriculture are predominant. Finally,

the great value of a national building-up of blood by inbreeding was no longer recognized, and even now it appears that in buying breeding-stock more stress is laid upon the absence of consanguinity than upon any other point. There came a time in which the individuality was considered more than anything else, and the science of form underwent a far-reaching development. The performance tests followed, and nowadays there is a partial return to the ideas of the old views on the constancy of characters, which laid so much value on the ancestry. Only that the latter is now, more than in previous decades, connected with inbreeding and the care bestowed upon certain lines of blood.

This development need not convey the impression of groupings in the dark. The development of individual examination was certainly not useless, and the sharp insight of the breeder can never be replaced by pairing according to tables of pedigrees. Anyhow, it is too radical to maintain that it is impossible to draw any conclusion as to the performance and breeding-value from the outer appearance of the animals. The pedigrees point out the way of a systematic building-up of the breed, but for judging the value of an animal the decision will always be given by the outer conformation and by the performance.

It may be that the great importance attributed by breeders to ancestry and pedigree may be due to studies on human conditions. Genealogy, which has become a special science, seeks and examines the descent and family relations of men, making use of chronicles, ecclesiastical records, lists of corporations, and the like. Many historical events become psychologically intelligible only when the families (together with their characteristics) of the principal actors are known.

Genealogical science has also investigated inbreeding, and very important knowledge has thus been gained. In the first place, researches on individual families have shown how tenaciously certain traits are inherited, and how important it would be in contracting marriage to possess ample knowledge of the respective families. The works of Reibmayer, Sommer, Ziernier, and others are of the greatest interest in this connection.

Count von Lehndorff will always have the merit of having been the first, in his "Handbuch für Pferdezüchter" ("Handbook for Horsebreeders"), to illustrate by means of painstaking work and the necessary proofs the bearing of inbreeding and breeding by families in the raising of horses. He thus showed the way to be followed in applying to other kinds of animals a great part of what he had discovered in the breeding of thoroughbred horses. The severe strain upon the constitution which is afforded by racing is already a selection of all those animals which are best adapted to stand the injurious effects of inbreeding. Similarly, in breeding half-bloods the conditions for obtaining health and a good constitution are in general more favourable in horses than in other animals.

Nevertheless Herr v. Oettingen, who has studied further the question of inbreeding in the light of his ample experience, and also from a theoretical point of view, insists that close inbreeding frequently maintains its evil consequences. In his book "Zucht des edlen Pferdes" ("Breeding of Thoroughbred Horses") he says, "Unfortunately, many insuccesses are recorded in the Trakehner Studbook when inbreeding closer than that of one "free generation"* was used. A weak, delicate constitution, light bones, and sterility have also been among the Trakehner half-bloods, the consequences of inbreeding pushed too far. With a natural breed endowed with more robust constitution, such as the Steppe breeds, close inbreeding with one or no free generation may be practised without any bad consequences for a greater length of time than with the improved breeds. Indeed, even within the improved breeds the more robust, *e.g.*, the thoroughbreds, as said above, seem to stand close inbreeding better than most half-bloods, especially those too delicately nutured. The old experience that continued inbreeding may lead at last to serious drawbacks must not be considered too lightly by modern German breeders.

Dr. De Chapeaurouge, of Blankenese, near Hamburg, is a medical man who has devoted himself to the study of inbreeding and has recently taken a foremost

* Instead of the English word "remove," Count Lehndorff uses the German words "freie Generation," the sense of which differs somewhat from the former.

In order to count the removes between a given animal and one of its ancestors represented both on the paternal as well as on the maternal side, each generation on either side is counted separately, including the parents of the animal in question.

On the other hand, in counting the "free generations" the sire and dam are omitted, and the other generations are counted together both on the sire's side and on the dam's.

position in the investigations on the pedigrees of domestic animals. His book on inbreeding (Rademacher, Hamburg) treats the subject exhaustively, and the whole present movement is intimately connected with his name.

Gustav Rav, in his book "Die Not der Deutschen Pferdezucht" ("The Requirements of German Horse-breeding"), has demonstrated how valuable inbreeding has been in the development of all our half-blood breeds. For several years past the Deutsche Gesellschaft für Zuchtungskunde (German Association for the Science of Breeding) has exerted itself, together with Dr. De Chapeaurouge, in the investigation of the nature and effects of inbreeding and in the efforts to render the importance of systematic progress in this direction clearer to the breeders. The collection of pedigrees that Dr. De Chapeaurouge already possessed has rendered possible the institution of a special archive for the investigation of ancestors and of inbreeding. Courses of instruction have been started, and the society has, besides, undertaken to supply pedigrees for the animals of certain breeds. In a special pamphlet the society has proposed a uniform form and mode of entry for pedigrees so as to render them easier to read. These proposals deserve to be taken into consideration, and they will doubtless lead to a more general recognition of the importance of breeding by families and by certain lines of blood.

How does the question stand at present in Germany? In horse-breeding, as has been said above, Count Lehndorff and v. Oettingen are at the head of the movement, and their decisive investigations have demonstrated that the prospects of success with inbreeding are most propitious with about four free generations. When in the improved conditions of a district provided with purebred animals the best are always used for breeding purposes, the result is that the most valuable races become better known and esteemed, and inbreeding gets introduced by itself. As, on the other hand, too close inbreeding is feared, very likely the approximately right proportion will be found by practice. This has proved true in the systematic investigation of descent in the most varied fields of breeding, and holds good not only in thoroughbred horses, but also for Rhenish draught horses, as has been fully demonstrated by Dr. Frizen's recent work on their most important lines.

In the breeding of cattle under present conditions, especially in peasant farms, a great deal of inbreeding is practised, and the mischief is often unmistakable. On the other hand, here also often a systematic and well-calculated inbreeding is carried out, and it appears to be an excellent means of improvement. Unfortunately, in the German Empire the investigation on inbreeding in cattle cannot be everywhere sufficiently pursued because the keeping of herd-books is comparatively too recent. But in the districts where Shorthorns are kept and in East Friesland better conditions obtain, and for the East Prussian breeding Peters has produced a fine work on the use of inbreeding and the breeding of certain lines of blood. It appears that here also, as in East Friesland and in Schleswig-Holstein, the blood of certain remarkable ancestors has a special significance, and that the success in breeding depends to a great extent upon the continued connection with these lines.

In the breeding of pigs inbreeding was formerly almost generally avoided, and, considering the prevailing custom of keeping them in sties, it was quite right to do so. Recently, however, it is sufficiently well known to what extent breeders practise inbreeding, and the systematic breeding by lines. Thus, for instance, Hoesch has pointed out that in breeding the improved Neukirchen pigs the inbreeding of specially strong animals gives an offspring possessing unfailing good growth, high powers of utilizing food, and fine shape.

As for sheep-breeding, there is no doubt that in England as well as in Germany much use has been made of inbreeding. Recently Dr. Schmehl, in Part 15 of the publication of the Deutsche Gesellschaft fur Züchtungskunde (German Society for the Science of Breeding), contributes an investigation on the conditions of breeding in the Zemlin Rambouillet flock, and here also it appears that most of the animals are the result of a decidedly close breeding. If frequently the objection is raised that excellent sheep flocks have been ruined by inbreeding, the accompanying circumstances should be looked into. In a preceding paper I have shown that at the time when all efforts were directed to the production of very fine wool they led to a general refinement of the whole body of the sheep. It is evident that the bodies thus rendered delicate were not the most suitable for inbreeding, though on inbreeding in itself this cannot be considered as an equitable verdict.

Especially remarkable are the observations that refer to systematic inbreeding for the production of exceptionally fine sires or good dams. Bruce Lowe, in his work on the breeding of racehorses, upholds the principle that excellent stallions can best be obtained when the sire is paired with a mare who possesses in her line some famous individual which is found also among the maternal ancestors of the same sire. An instance of such a pedigree is furnished by the genealogy of Araber, a thoroughbred of the Württemberg Oriental stud at Scharnhausen (after Adlung).

Araber	Salamander	Doge	
		Sarah	*Amurath* ■
	Amadine	Padischah	
		Amourette	*Amurath* ■

Hoesch has made some observations in his herd of native improved pigs at Neukirchen which tally perfectly with Bruce Lowe's opinion. According to this method of pairing a whole series of very good boars was obtained. The pedigree of one of them, Nero, is here given as an illustration. On the other hand, excellent dams were obtained by a composition of the strain in which the remarkable ancestor, as basis of the inbreeding, is found not only on the mother's side but also in the paternal series of ancestors of the sire. An instance is afforded by the pedigree of Ruhe.

Nero D. L. G III Prize	2059 III Prize	883 N. D. L. G. Ia, Ia, Ia Prize	925.
			Richard D. L. G. Ia. III, I Prize ■
		Herronin	
	Naturkraft	883 N.	925.
			Richard D. L G. Ia, III, I Prize ■
		Kraft	
Ruhe D. L. G. IV, II, III Prize	3283 D. L. G. I Prize	1850	884.
			Richard ■ Ia, III, I Prize.
		Riese	08.
			Richard ■ Ia, III, I Prize.
	Rudhard	015	
		Rubin D. L. G. II Prize	St. 4.
			Richard ■ Ia. III, I Prize.

We may safely say that in Germany in all the important branches of stock-breeding the question of inbreeding is being most actively studied. Instead of entertaining opinions, views, and prejudices, the tendency is to form a solid foundation of facts. These efforts have a far-reaching importance, and in all cases when the herd-books have allowed it they have obtained valuable results. It has been found everywhere that really important breeding-animals always belong to families in which the excellence of their blood is especially due to a few pre-eminent ancestors, and when this is recognized the real value of inbreeding and of lines of blood is put in its true light. Consequently no expert would think of recommending a careless use of inbreeding, and the great number of insuccesses of the method, even in the hands of good breeders, is not denied by any one.

On the whole the present tendency is towards emphasizing selection, a more rigorous picking-out of favourable hereditary variations. Those also who believe in the heredity of the good qualities and improvements that animals acquire through being well cared for must admit that in the great number of animals there are only a few that transmit with certainty to their offspring their special traits of form and of performance. It may be that these qualities are derived from favourable modifications of the germ plasm of the parents. The connoisseur's judgment for the beauty of the animal, and the tests for its performance, must be increasingly applied in connection with breeding according to pedigree, in order to spread throughout the breeding districts the high quality of the blood of certain animals by the greatest possible utilization of inbreeding. How it happens that of these animals possessing remarkable qualities only a few are capable of producing important results in consanguineous breeding and in breeding by families, while others completely fail to do so, is a question that at present is shrouded in obscurity. Some light could perhaps be soonest thrown on the question by researches in sheep-breeding, for the flock-books give an idea of the conformation and of the build of the animal in relation to its resistance. Here I agree fully with C. Lehman, who, in No. 16 of the "Deutsche Landwirtschatliche Tierzucht" of this year, regrets that Dr. Schmehl had not extended his investigations in this direction also. It might perhaps have been shown how often the insuccess of certain animals is due to a weak constitution, and how far it may be due to other causes. Such causes might appear to be that the blood of the unsuccessful animal on which the inbreeding was based (basis of inbreeding) was not yet sufficiently fixed, or the case might be led back to the above-mentioned question—namely, whether the merits of the basis of inbreeding derive from favourable variations of the germ plasm (are blastogens) or from better conditions of environment (acquired qualities). In the latter case heredity could tell less.

Be it as it may, practical breeding can hope for great results from the present aims and methods. From a biological point of view, however, it would be of the greatest importance if the question of inbreeding among the various animals were studied in connection with the theory of chromosomes. Probably very useful results would be obtained.

UTILIZING THE BAT.

ERADICATES MOSQUITOES AND PRODUCES A HIGH-GRADE FERTILIZER.

IN San Antonio, Texas, U.S.A., Dr. Chares A. R. Campbell has carried out an interesting series of experiments in connection with the eradication of mosquitoes by means of the cultivation of the bat, which is declared to be the greatest enemy of the mosquito. A very valuable feature of the work was that a simple means is thereby provided of securing definite supplies of guano. In certain parts of America the mosquito is one of man's most formidable enemies, not only by reason of its aggressive tactics, but also on account of the subtle role it plays in transmitting disease-producing bacteria. Dr. L. O. Howard, Chief Entomologist of the United States Department of Agriculture, very conservatively estimates the tribute which that country pays to malaria at one hundred million dollars.

For the cultivation and propagation of the bat Dr. Campbell has devised a kind of wooden tower or roost which offers the advantage of preventing bats—which are obliged usually to fly long distances from their caves in search of food, remaining continuously on the wing for ten and twelve hours at a time—from always seeking new quarters. Bats possess plenty of means of protection against their enemies, and are remarkably free from disease of any kind. That mosquitoes form the chief diet of bats is certain, 90 per cent. being a conservative estimate. Much of the work in the experiments was purely scientific, but it demonstrated the enormous value of bats. It is calculated that from one bat-roost of capacity of 500,000 bats would be obtained 20¼ tons of guano in eight months, and that the erection and maintenance of these roosts would be well repaid by the substantial income from the droppings of the bats. Dr. Campbell's hygiostatic guano-producing bat-roost, which was erected as a working model for demonstration, has proved a very successful structure for the purpose, being supported on posts to enable a dray to be driven underneath the base, which is provided with a hopper on hinges and which opens downward, enabling the guano to be easily collected. It may be noted that in certain districts where the bats are numerous the work of collecting manure from the caves where they have their homes is quite a profitable means of livelihood.

The most important conclusions of the experiments are: That there can be built for the bat a home where it will be protected from its enemies, and will propagate in countless numbers, at the same time protecting the people of the country by improving their hygienic conditions; that the commercial feature in the propagation of bats will ensure its adoption, and the hygienic benefits that follow will protect the community in which it is carried on; that when this useful creature is propagated it not only destroys the disease-producing mosquito that serves as its food, but it actually converts that most malevolent of insects into a high-grade fertilizer.—*Summarized from the "Bulletin of the International Institute of Agriculture."*

MILK-RECORDS.

The situation in regard to the milk-recording scheme of the Highland and Agricultural Society of Scotland is admirably summed up in the last issue of the Transactions of the society. After tracing the growth in the number of cows tested annually to 13,965 in 1911, it says,—

"To achieve this result has cost the Highland and Agricultural Society £1,800 during the past nine years. It may well be questioned whether any expenditure more profitable to Scottish agriculture has ever been made. The advantages of milk-recording may appear at first sight to have been chiefly obtained by those who possessed animals of great milking-capacity, and were able, by recording, to have the value of their stock attested, and to realize the prices which have been increased from year to year for the best milking-stock. But, in point of fact, the benefit has been widespread. The fact that the milk-yield of nearly fourteen thousand cows is now under systematic observation, so that a deliberate selection is going on among these animals, is of enormous consequence in the agricultural economy of the country. Its importance is attested by the kind and degree of improvement that is to be found from year to year in almost every recording society."

It goes on to state that if the average gain is only 20 gallons per cow per annum, it represents an increase of 20 per cent. in the profits from dairying. It, however, does more than this, and its effects are cumulative. Bulls are being sought for from good attested milking-strains, and a really scientific and systematic effort is in progress to improve the whole race of milking-cattle in the south-west of Scotland. The practice is said to have become a factor of first-rate importance in Scottish agriculture.

The Development Commissioners of Great Britain have now granted £900 per annum towards the funds of the Highland and Agricultural Society's milk-record scheme, thus raising the available funds from £200 to £1,100.

THE HEMP INDUSTRY.

W. H. FERRIS.

MARKET values continue to warrant the milling of a good-fair grade of fibre. Lines which have come to hand by rail—shipments by sea having been greatly restricted owing to the disorganization of the shipping business—are of a very satisfactory standard, good work having been done with good leaf. Generally the leaf available this season is apparently of a greatly improved character compared with that of last season—a decided encouragement to millers to turn out a high-quality fibre. Quite a number of brands which had to be consistently graded "low-fair" and "common" last season are now fully warranting a "good-fair" grade. Obviously it will be to the distinct advantage of the industry if this improvement be maintained, as manufacturers abroad will thus be supplied with large uniform lines of phormium hemp of a high-grade character.

While the quality of the fibre is exhibiting a marked advance, the quantity being produced is of greatly increased dimensions. If prices are maintained, this season's output should constitute a record. Practically all the mills throughout the country are working at full pressure, and the supply of leaf is abundant. The millers of Marlborough are turning out largely increased supplies of fibre, and, as is invariably the case, the quality is most satisfactory. Good work is also being done in Hawke's Bay and the Wairarapa, the leaf in the latter district being particularly good this season. One Wairarapa miller has recently installed a thoroughly up-to-date plant, including the latest labour-saving appliances.

Tow is exhibiting a great improvement. Free of rubbish and dirt, and being of a good colour, the lines being shipped are most satisfactory. This is another instance of millers attaching importance to quality only when the market is favourable, forgetting that an inferior article is always a weakness in encouraging consumption and building up a permanent trade connection. For some time tow has been in poor demand, and many millers have attached little importance to quality, often baling a mass of rubbish

for exportation. With the recent advance in the market value of tow, induced by the shortage of jute, better attention is being paid to quality, and the bulk of the tow being turned out is of an excellent commercial standard. Could all our tow be consistently shipped in the same condition a permanent and payable connection could no doubt be created for this by-product on oversea markets. With reliable supplies of a commodity, manufacturers are encouraged to extend its use and amend their machinery accordingly.

THE POSITION IN MANILA.

H.M. Consul-General at Manila (Mr. A. E. Wileman) reports, under date 19th June, that in addition to the realization of the anticipated shortage in the crop in the first half of this year, owing to the drought and typhoons of 1912, other influences have arisen to make the state of the market at present exceptional.

The total production of hemp up to the 17th June was 454,000 bales, as compared with 639,000 bales in the corresponding period of 1912, so that a conservative estimate would give a falling-off of about 210,000 bales, or 26,250 tons, for the first six months of 1913 as compared with the same period last year. Moreover, shipments of hemp to the United States and Europe show decreases of 130,000 bales (16,250 tons) and 160,000 bales (20,000 tons) respectively, a total falling-off of 290,000 bales. Therefore the shortage of supply being only 210,000 bales, it would appear that the demand for hemp has fallen behind even the decreased supply during the first six months of 1913.

American fibre authorities declare that binder-twine from New Zealand hemp does not retain its strength if kept for a period of years, while manila and sisal twines do not deteriorate perceptibly for a long time.

In America sisal hemp is becoming a competitor against manila hemp for the manufacture of binder-twine. It is declared to be a most effective substitute now that machinery has been adjusted to suit its special requirements. It is produced from the henequin plant, which grows well in the arid territory of Yucatan.

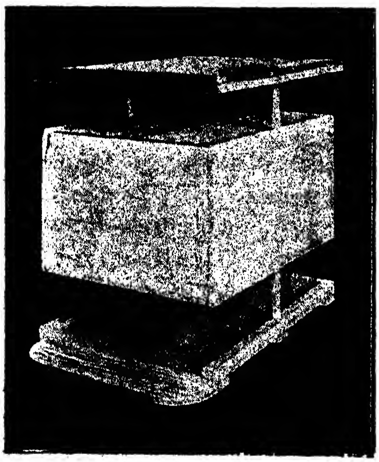
THE APIARY.

F. A. JACOBSEN.

SEASONABLE HINTS.

EACH successive season has fully demonstrated the advisability at certain times of the spring of giving bees extra stores to enable them to push ahead with their breeding, and even in the month of December there are times in certain districts when colonies become short of stores and require artificial nourishment.

At this period it is necessary to observe closely the behaviour of the individual colonies. This will enable those familiar with apiary-work to take the proper steps in good time, and so attain the best possible results. If the bees are found clustering outside the hive-entrance in unusually large numbers it will be an indication that another super must be added to the tier, or that the colony has not sufficient ventilation. In the latter event lift the front of the body of the hive, and place ½ in. blocks between it and the bottom board, thus giving a much broader entrance. This should have the desired effect of inducing the loafers outside to recommence work. Proper ventilation with plenty of room for the bees to keep working are points that materially assist in the profits of apiculture.



PETROL-CASE HIVE.

Do not wait, however, until the bees are seen clustering outside, but examine each hive about once a week, and determine whether a super is required. Remember that during a honey-flow a powerful colony will fill a super in that time, and that every opportunity must be taken during the nectar season to keep the bees working at high pressure.

It is always well to be prepared, and now is the time to look over your extractor, engine, &c., and effect any repairs that are necessary before the extracting-

A SECTION OF THE RUAKURA APIARY.

period has commenced. Very often serious delays are caused by waiting to do these things until the last minute, and I have known severe losses to occur through negligence in this respect.

PETROL-CASE HIVE.

Those beekeepers who cannot afford to purchase modern hives or who live in out-of-the-way districts where these are not readily procurable may construct a very good substitute out of a petrol-case. How this case is converted into a hive may be seen from the illustration on page 660.

HONEY EXPORTED.

At the recent growers' exhibition in London very favourable remarks were passed as to the quality of some Taranaki honey on view. One prominent provision-merchant went so far as to say that in his opinion it was the finest honey imported into the country. This should encourage New Zealand shippers.

THE RUAKURA APIARY.

THE apiary of the Ruakura Farm of Instruction, established by Mr. I. Hopkins in 1905, is now widely known as a model apiary and an important centre of advancement in apiculture. It comprises over a hundred colonies. Among the important demonstrations carried out at this apiary have been different methods of queen-rearing, the utilization of wastage (honey that could not be marketed), by converting it into vinegar and meed, and the use of the hydrometer in determining when honey is fit for market. As soon as convenient it is intended to raise Italian queens for distribution.

The apiary is in charge of Miss D. Hart, who received her training at Ruakura under Miss Livesay. Miss Hart has now been in charge about three years, and has herself trained several cadettes, two being under her direction at the present time. Mr. I. Hopkins still supervises the work at this apiary.

Mr. N. R. Pierce, Orchard Instructor, Auckland, reported in the last week of November that heavy winds and rain had caused a lot of damage to plums and apricots, a quantity falling, especially those ripe and in the ripening stage.

ORCHARD WORK FOR JANUARY.

W. A. Boucher.

Cultivation.

As recommended in previous issues of the *Journal*, clean cultivation of orchard lands should be maintained, especially throughout the warm dry months of summer. During periods of dry weather it is only by this means that sufficient moisture can be retained in the soil to enable fruiting trees to continue their normal growth and develop their crops.

Codlin-moth.

In some districts of the Dominion growers have expressed the opinion that there is but little danger to be feared from infection by codlin-moth after the end of December. This idea is quite erroneous. Careful investigation of the life-history of the codlin-moth in New Zealand has demonstrated that a large percentage of the grubs that have escaped from infected fruit during one season remain dormant throughout the months of November and December, and only develop into the chrysalis and moth stages towards the middle of January of the following year. It is, therefore, most important that the necessary measures—in spraying carefully and thoroughly with a reliable brand of arsenate of lead—should be carried out during the early part of the month; in any case, if possible, not later than the 10th, in order to protect crops of pip-fruits from the inevitable percentage of loss that will ensue if spraying at this critical period has been neglected. It has been noticed that some growers have been inclined to delay the application of the first spray for the control of codlin-moth until rather late, while others will commence sufficiently early and discontinue operations before all risk of moth-infection is over for the season. In both cases the result is the same—more or less of the crop, according to the general condition of the district, being rendered unmarketable owing to the presence of the grubs of this pest. In view of the fact that the export trade in apples is steadily developing season by season, it is most important that all commercial growers should make every effort to eliminate the possibility of moth-infected fruit leaving the ports of the Dominion for foreign

markets. It should be recognized that, if necessary, provision should be made for storage before grading and packing, so that any codlin-grubs from eggs in the process of incubation might be hatched and the detection of infection thus made possible. If this is not done fruit upon which eggs are in process of development will be packed with fruit that is free, and in transit develop infection, which must be detected at the port of destination, and so bring discredit on our export trade.

BRONZE BEETLE AND LEAF-ROLLER CATERPILLAR.

Leaf-roller caterpillar is always more or less troublesome during the summer months. This pest, unlike the larvæ of the codlin-moth, does not eat its way into and through the fruit, but usually, fastening a leaf to the surface, is content to exist beneath this protective covering by nibbling the skin and a portion of the flesh of the fruit. The result is to cause a blemish which remains and gives an unsightly appearance. Not only does fruit so attacked lose much of its marketable value when offered for sale locally, but it must be considered as quite unsuitable for export purposes. Generally speaking, the spray that is applied for the control of codlin-moth is effective in destroying the leaf-roller caterpillar, provided that the fruit has received an effective coating of the poison before the caterpillar has attached the protective covering mentioned above. In many parts of the Dominion the bronze beetle will by this period have ceased to give further trouble for the season. As previously recommended in the pages of this *Journal*, the addition of a small quantity of resin solution to the arsenate-of-lead spray during the early part of the season will add much to its effectiveness in controlling the beetle.

APPLE AND PEAR SCAB.

In districts throughout the Dominion where warm dry weather is experienced during the month of January little or no further trouble will be experienced with apple and pear scab for the remainder of the season. This is due to the fact that a comparatively low temperature with rainfall and a moist atmosphere are necessary for the development of the fungus, which causes such injury to the skin of the fruit as even to bring about cracking in cases where the attack has been severe. For the control of apple and pear scab up to the present time no remedy has been found that is quite as effective as the Bordeaux mixture. It is true that under certain atmospheric conditions russeting of the fruit will follow the application. This is especially so in the case of

some of the tender-skinned varieties. Many experiments have been carried out with a view to discovering an effective and safe substitute. The lime-sulphur solution has been under test for some time past, but, as in the case of the Bordeaux mixture, certain atmospheric conditions seem to bring about results that are not altogether satisfactory. Further tests may furnish some interesting data for further reports. As mentioned above, in some districts no further trouble with apple and pear scab may be experienced during the season, but in others, less favoured, growers will still require to take the necessary precautions to protect their crops from attack.

Leech.

As far as pears are concerned, bearing trees will in most districts have been sprayed with arsenate of lead for the control of codlin-moth. This will also prove effective for the control of the leech. In the case of cherries some growers prefer to use arsenate of lead as for codlin-moth, while others prefer hellebore powder. The latter is also recommended for some varieties of plums the foliage of which is susceptible to injury if arsenate of lead be applied.

Tomatoes.

Tomato-growers will find it well worth while to keep tomato fungus diseases and caterpillar well under control. The Bordeaux mixture summer strength for fungus diseases, to which 1½ lb. of arsenate of lead has been added for caterpillar, has proved to be thoroughly effective in keeping the plants healthy and vigorous. Care, however, should be taken to spray the under-sides of the leaves thoroughly. To accomplish this a bent elbow is frequently used in order to direct the spray upwards from beneath.

GRAPE-CULTURE.

S. F. Anderson.

Vinehouse Notes for January.

In preparing these notes for the *Journal* the standard taken has been that which is according to the best practice as recommended by the highest authorities on vine-growing, and on the lines of plant-growth as laid down by leading plant physiologists of the day. Too often, however, one finds vines being grown where satisfactory conditions are not observed. Overcrowding of the vine-rods is the most common, the space allowed for the fruit-bearing

laterals from each side of a strong rod or from rod to rod being often only 2 ft. Let this be compared with the practice now being followed for regulating the growth and the fruit-bearing wood of other trees. The system is to keep the tree open—to prune so that the greatest amount of sun can reach the foliage. The leaves, as the assimilating organs, must be adequately developed or the best results cannot be obtained. Note the effect on leaves that do not get the sun—their light-green colour and general poor development. If it is necessary to observe these rules for the growth of outdoor fruit-trees, is it not much more so in the case of vines that are grown under glass and are being forced?

To those growers who have found themselves with a house where the vine-rods are too close for the best development of the fruit the following is recommended: After the second stopping of the laterals, as directed in the vine notes of the September issue of the *Journal*—that is, when they will be from 18 in. to 24 in. long—keep the end of the shoot confined to that length, and encourage the growth of the sublaterals that push out at the axil of the main leaves and occur between the fruit and the end of the shoot. Any that come out between the fruit and the main rod must be kept back or broken clean out. If this be done, in place of having a lateral with only the usual main leaves we have a branching lateral which provides more leaves and does not run so much among the foliage coming from the opposite direction. These, of course, must also be kept within reasonable limits by judicious stopping.

If the reader can refer to the February issue of the *Journal*, at page 161 he will see a photograph of two vine-rods in full bearing. These are a fair distance apart, but even at this space between the rods it can be seen how one lateral overlaps the other; but where they are much less than this distance apart it becomes necessary to adopt the above method of treating them, to provide the necessary foliage for the nourishment of the fruit. The accompanying sketch will possibly enable the grower to better understand the method advised.

A, Rod; B, Lateral; C, Where lateral has been stopped; D, Sub-laterals allowed to develop three or more leaves to make up for lateral stopped at C.

Those who have not sulphured should do so without delay. Mildew has already made its appearance in some houses. Mealy

bug will be most troublesome during this and next month. It is rather early yet to attempt cyaniding, but nicoticide may be used. Some growers state that it has given good results. The directions for its use are given with it, but it is preferable to use more evaporators than are suggested, and use less of the liquid in each vessel, as under some conditions there is a tendency to boil over.

VINEYARD WORK.

Table-grapes.—A large area of Albany Surprise and Isabella grapes are now being grown for the market. In a number of places throughout the North these are being left untended, and the growers are content with what they can obtain from them in this way. The small size of the bunches and the depredations caused by birds make the yield very small. Let these growers try a plot of, say, a quarter of an acre and grow as advised in Bulletin No. 11 (New Series), and give every attention, and the results will convince them of the value of good work as against neglect. As well as the above-mentioned varieties the Black Hamburgh responds well to training and culture.

Wine-grapes.—The growth of the wine-grapes everywhere this season has up to the present time been very vigorous. Before stopping the fruit-shoots always see that the shoots from the crown of the plant—(1) rods intended for tying down and fruit-bearing next year, and (2) rods intended for spurring back—are cared for first. These require to be brought straight up and twisted round the top wire. Should they send out strong side shoots these should be pinched, but not the terminal—this is allowed perfect freedom of growth. In the case of the fruit-bearing shoots growing up from the laid-down rod, these can all be maintained at the same level (because the rod is tied to a level wire) by pinching. This should always be done in moderation. By this I mean that although the growth of the fruit-bearing shoot must be well supplied with leaves it cannot be allowed to go higher than the top wire—that is, a vertical growth of about 3 ft.

About twenty-two varieties of tomatoes are under test at the Ruakura Farm of Instruction this season.

At the Ruakura Farm of Instruction fungoid diseases are at present (7th November) spreading rapidly, necessitating frequent sprayings. Onion mildew has made its appearance exceptionally early.—*A. W. Green.*

THE FARM GARDEN.

W. H. TAYLOR.

VEGETABLE-CULTURE.

Tomatoes.—There are many ways of training tomato-plants. Some growers train them on wires, some to upright stakes, while others let them lie on the ground. The last-mentioned plan is good enough when the fruit is intended for a sauce-factory. Naturally, however, it cannot be depended on to supply perfect fruit, and a rainy season would be likely to damage a lot of the fruit. If a few dead branches of a twiggy description, such as macrocarpa or manuka, were laid beneath them it would save them to a large extent. This is, in fact, a very old plan, and answers well as a makeshift. In these days when blight is so prevalent it is wise to make every effort to support the growth clear of the ground, for plants lying on the moist soil must of necessity be more liable to suffer than those high and dry. My observations show that plants which are subject to a good circulation of air and are grown hard are least liable to blight. Weed-growth should be kept under. Weeds not only rob the plants of food, but a heavy growth creates a moist atmosphere—a condition to be avoided. A wild growth of laterals also tends to prevent a free circulation of air and the desired hardening of growth; waste growth should therefore, if for no other reason, be prevented. It is presumed that no one would attempt to grow tomatoes on absolutely poor ground. It appears to me that they require soil which would be generally regarded as fairly good, and, given that, animal manure or anything of an exciting nature should be avoided. Not long since I saw a promising crop ruined by being watered with ammoniacal liquor from a gas-house. This induced a rapid and consequently soft growth, and in a short time the plants went to destruction owing to blight. Once I held the opinion that the best way to grow tomatoes was to choose dry soil and work in a fair amount of rotted stable manure. I had succeeded admirably in that way. However, I have since modified my views, and now think that that is the proper course to pursue with abnormally dry soil, but that such soil should be employed only in cases of necessity. In any case, I believe it to be wrong to water the plants at any time, or to give liquid manure to outdoor plants.

Planting Winter Supplies.—Before the next number of the *Journal* is issued the whole of the winter supply of broccoli, savoys, Brussels

sprouts, cabbages, and leeks should be out. Where the numbers to be planted are small the method of planting is, perhaps, not of much moment, yet there are few who would not be glad to find quicker ways. The old-fashioned style of planting with a dibber has long been abandoned by progressive market growers. Some farmers plant cabbages by means of the plough, but even that is slow and open to many other objections. The method of planting by hoe has before been described in this *Journal*, but still I find that very few are acquainted with it. Plants put out with a hoe take to the soil better than those put out with a dibber, and this alone is sufficient cause for its adoption. With a dibber a first-class man can plant about fifteen hundred in a day of eight hours if the soil is free. With a hoe the same man can plant between four and five thousand. Personally I can plant six hundred in an hour. The hoe required is made for the purpose for large users. The blacksmith makes it of substantial material, about 3½ in. wide and 6 in. deep. For myself, I make a worn drag-hoe do. The handle should be about 15 in. long. The plants are carried in a shallow box. This is kept on the ground and is dragged forward by the left hand, which takes out the plant, while the right manipulates the hoe. A smart blow drives the hoe into the soil, and a slight pull opens a space beyond the hoe. The roots of the plant are thrust in this space, the hoe being withdrawn to allow the soil to fall about the roots. By this method the roots are surrounded with moist soil; the dry crumbs on the surface do not fall in as they do when a dibber is used. When any number is to be planted the rows should first be scratched with a marker, a line being used for a guide for the first row only. The plants should be pulled and placed in a tub with a couple of inches of water in it, and drawn from the tub as required. They will need no watering after planting.

Peas should be sown at intervals of two weeks till the middle of January.

French beans may be sown at rather longer intervals.

If ground is available *silver-beet* may be sown. The time when it is most valuable is in early spring after the winter cabbages are past. If sown by the beginning of February it will be ready for use in spring, just as well as, but more developed than, when sown earlier.

After the planting of *cabbages, &c.*, previously referred to, there is not much work to do in the vegetable-garden for a time, with the exception of attending to cultivation and other incidental work. The soil should be kept loose between crops at all times.

Celery.—The last and most important planting-out should be done at once. Copious watering is almost an essential to celery-

growing. Where the soil is good and plenty of rich manure has been worked into the trenches it will certainly grow fairly well without watering after the plants have started, but it does infinitely better where it is well watered, even to the extent of filling the trenches up with water. Early planted celery may be ready for moulding up. It is rarely now that the custom is practised of moulding by degrees as the plants grow. When earthing begins watering is practically useless, and growth is less strong. Moulding up is, therefore, usually left until the heads are large enough for use. One matter in this connection, however, always requires early attention. Growing naturally, the first leaves spread out nearly horizontally. If they are left so it is nearly impossible to bring them up after they get set, the stalks being too firm to bend without breaking. The loss of them would not be serious, but they are valuable because they help to keep the soil out of the centre of the heads. For this reason they require to be brought to an upright position after making a little growth, by pushing in a little soil from the bank and pressing it firmly about them. The so-called "self-blanching" varieties should be moulded up in the same manner as the others, for although the stems are more or less white or yellow, they gain in crispness by moulding up. Never mould these varieties till fully grown, for they have not the vitality of the green sorts. For this reason they should not be grown for winter use, because they soon perish when the weather becomes wet and cold.

SMALL FRUIT.

Loganberries produce only one crop—that is to say, the crop is almost a simultaneous one. The fruit on the base of the bunches ripens first, and that on the points last. This is the extent of the duration of the crop. When these are past there will be no more for the season, and when that has happened there is no further use for the wood that carried it. It may then be cut right out and a sufficient number of new rods laid in to replace them.

As soon as all the fruit is gathered *gooseberry-bushes* should be sprayed with Bordeaux mixture of 4-4-40 strength. This is a necessary precaution against the leaf-spot, a most destructive disease when it is unchecked, resulting sometimes in a total loss of foliage. When this occurs a new growth is made, this new growth emanating from the buds that should remain dormant till the following spring. Such bushes can bear no fruit the following season. Many regard this disease lightly because they happen not to have suffered from it. It appears, however, to be spreading very rapidly, and the

precaution is so simple that the wisest course is for all growers to take it.

Red-currant bushes should still have attention in the way of checking exuberant lateral shoots. As pointed out before, the fruit is borne on spurs, and never on the young wood. An extension of such growths is, therefore, not only useless, but actually harmful. It prevents a free circulation of air and access of light, both necessary to develop the spurs. The laterals must not be broken or cut hard down. The first stopping should have left them 6 in. long. Subsequent pinching may be beyond each pair of new leaves, or about that length. The laterals have their uses, of course, or they would not be there. Their purpose is to provide bearing-spurs. These form at the base of the laterals—on older wood also—and if the laterals were shortened too much this would be prevented. The buds that should form fruit-spurs would start into growth, and produce a weak spray growth, similar to what occurs on defoliated gooseberry-bushes already referred to.

Black Currants.—Now is a good time to determine what branches, if any, require renewal, and to provide for their replenishment by preserving any suitable young shoots there may be from the stool suitable to replace them. As there are more than one eligible way to train black-currant bushes, the above remarks will not be understood by those accustomed to the clean-stem method. Some explanation may, therefore, be advisable. The great trouble with black-currant culture is the stem and branch borer, which may cause the loss of a branch, or even the entire bush, at any time, if the bush is trained to a single stem. The fact that the black currant bears fruit freely on wood of the previous season's growth offers a ready means of defeating the borer. Instead of training the bush to a single stem, as is done with gooseberries and red currants, the bush is encouraged to stool—that is, to throw up shoots from beneath the surface of the soil. When cuttings of gooseberries or red currants are made, all the buds, except a few at the top, are carefully cut out. This prevents suckers from springing from below the surface. When making cuttings of black currants, if the bushes are intended to stool, no buds are cut out. Shoots then come from below the surface, and these, if encouraged to grow, will develop into strong branches. By removing an old branch occasionally and leaving a young one to grow up in its place the bush is kept practically young and borers are not much trouble, but the most valuable feature of the plan is that if a branch should be lost through borers it is easily replaced.

Strawberries.—To secure good plants for fruiting next season the runners should be restricted. The best way is to root the

plants in alternate rows. There will then be no need to tread on the ground where they are rooting. Calculate the number required, and allow no more to form. Cut off the point of the runner beyond the plant. Two plants are quite sufficient from one runner, and one is preferable. When a mat of young plants is formed indiscriminately it must not be expected that they will furnish good fruiting plants.

The Flower-garden.

Spring-flowering plants such as wallflowers, anemones, and many others, being now past, the reserve stock of *summer plants* should be got out at once. In many places—probably nearly everywhere—it will be necessary to water the plants after they are put out. The days are hot at this time of the year, and rain less frequent. The most effectual and beneficial way to water is to apply the water before all the soil is returned. Thus, before closing up the hole made to insert a plant, and after the plant is in its place and part of the soil put round the roots, water it well, then cover up with the unwatered soil. The dry soil will act as a mulch and prevent evaporation, and it also tends to keep the soil about the roots cooler than it would be if watered through the top soil. When the latter plan is adopted the sun more readily penetrates. *Wallflowers* for flowering next spring should be sown about Christmas-time. *Aubretias* are very welcome spring flowers, and may be sown at the same time as, also, *Arabis*. *Anemones* raised in boxes should be pricked off into other boxes before they get too large, because the foliage is liable to become entangled by reason of the leaf-stalk getting drawn if they are left crowded. The drainage of boxes should be properly provided for, as they must remain in them for a long time, and if proper drainage is not secured the soil would sour. Before clearing away the foliage the position of all *bulbs* should be distinctly marked by a good label with the name plainly written. If a good layer of sand is put over the site it may have a very beneficial effect. If the soil is of a nature that is liable to crack, it will effectually prevent it. In any case it is a good plan, because it prevents weeds growing upon them, with the accompanying risk of injury to the bulbs in the work of eradication. The names of plants are often lost by reason of the name not being written in an enduring manner. It is useless to write on unpainted wood, and equally so to write on paint after it has dried, for the name is only on the paint and comes off with the paint in a short time if near the ground. The proper way is to rub some white-lead mixed with very little oil on the label; then rub it off again with a piece of rag. Rub hard so as to fill the pores

of the wood. The name should be written while the label is still damp. Write firmly and it will dent into the wood. Written in this manner the name will last as long as the label.

Pinks and Carnations.—After flowering, pinks should be cut into proper limits; they quickly spread out to an undesired breadth. Cuttings root with the greatest freedom. Pull the cuttings off with a heel and bed them closely in boxes of light soil surfaced with sand. Water them well after insertion. Stand the boxes in a cool semi-shady place and every cutting will root. Carnations do not root so readily, though experts have no difficulty with them. The most certain way with cuttings is to take them about midsummer. Choose a piece of nice ground under a wall, where they will be shaded most of the day. Then spread an inch of sand over the soil; put in the cuttings as close as they will go without jamming; water them; let the water drain off for half an hour; and then cover with a hand-light. There are many alternative methods. The one usually adopted is to put them in boxes and keep them in a rather shady place, with no covering. Cuttings are made from the last-made grass; there must be no old wood. Remove a few of the lower leaves and cut off the tops of the others with one cut. Split the bottom of the cutting up the centre for about half an inch. Some pull the pipings off with a heel instead of cutting them off.

Layering Carnations.—This is by far the best method of increase. By this means larger plants are obtained in a given time, and this is mainly because rooting is very rapid, taking from four to eight weeks from the time of putting them down to the time they are fit to be taken off the parent plant. To layer, cut off a few of the lower leaves in order to secure a piece of clean stem. Make an incision with a sharp knife just below a joint on the underside; cut half through the stem; then turn the knife and carry it up through the centre for about three-quarters of an inch. Have ready stout wire pegs shaped like a ladies' hairpin. Bend up the top of the layer so as to open the cut, and peg down firmly. Do not cut off the tops of the grass; to do so would delay rooting. It may be advisable to use sand to cover the layered parts. It should be used unless the soil is naturally very free. Carnations are now largely raised from seed, and for garden purposes this plan answers admirably. Now is a good time to sow, giving time to obtain before winter strong plants which will flower next season.

Delphiniums are amongst the noblest of all perennials. They are a fine feature at this time, and will be for some months. Seed sown now will provide good-sized plants to flower next season.

THE POULTRY INDUSTRY.

F. C. BROWN.

A RETROSPECT.

Now that the poultrymen of New Zealand are in possession of profitable strains of poultry and of more modern methods of management they are apt to overlook the advantages which have accrued to them in recent years — advantages which in large measure have been made available by the work of the Department. Let me draw a comparison between the conditions existing when the poultry plants of the Department were first established and those existing at the present day. Then poultry-keeping may fairly be said to have been on an unsatisfactory footing. The only stock available was of English origin—more of a fancy than of a utility standard—while our knowledge of poultry-keeping was also derived mainly from the home of the stock we were breeding. The poultry on the farms of the Dominion were generally of a nondescript character, and the method of management was such that they seldom did much more than pay for their keep. It might be said that the prices offering for eggs on local markets did not warrant the farmer paying special attention to the poultry department of his farm, but if prices were low the value of feed was not on the high plane of the present day. The work of the laying competitions, in discovering high-type layers—mainly Australian importations and their descendants—was only in its initial stage, and the guide to breeding operations thereby afforded was being made available only to the managers of the State poultry plants and to breeders of utility stock in general. The subsequent experience of laying-tests demonstrated that New Zealand poultrymen were possessed of the strains of birds necessary for the very highest results in egg-production. While the cost of production has advanced, there is now the better understanding of economical production. Among the factors tending to the elucidation of this latter problem are the questionable value of the second-year layer, the judicious use of meat in the diet, the employment of more sanitary houses, and a better understanding of artificial incubation and rearing.

ADVANCE IN EGG-LAYING POWER.

In view of the general appreciation at the present time of the first-year layer it is interesting to recall the motley collection of

birds penned in the first laying competition at Blenheim. Some of the most noted breeders in the Dominion sent second-year birds, while others forwarded pens which certainly did not earn the food they consumed. While imported blood easily led in the first competitions, several pens of locally bred birds gave a good account of themselves. Though the special-purpose fowl was apparently unknown at that time to the great majority of our breeders, there were a few poultrymen who had exceptional laying-strains, but these were not included in the noteworthy breeders of poultry. They were men who were aiming at the improvement of utility characters rather than of show points.

At the time the egg-laying competitions were instituted the laying of 200 eggs a bird by the winning pens was generally discredited, whereas at the last competition of the New Zealand Utility Poultry Club the average for all the birds taking part was over 200, while the winning pen averaged 272 eggs. Though there is room for improvement in the present system of conducting laying competitions, the fact remains that they have rendered very great assistance to the industry. They have undoubtedly been responsible for enormously increasing the laying-power of the poultry stock of the Dominion. The value of the competitions was realized at the outset by the Department, which has liberally subsidized the leading tests. By the agency of the poultry plants of the Department—which in recent years has developed its flocks on an egg-record basis—and through a big community of speciality breeders heavy egg-producing stock has been disseminated far and wide, until now the majority of breeders, both in the suburbs and on the farms, are possessed of stock of undoubted egg-laying value, which requires only to be managed intelligently to prove profitable.

Perhaps the most important lesson conveyed by the tests is the great superiority of purebred stock over crossbred or mongrel fowls. It has been conclusively proved that while purebred birds are capable of remarkable production they are also capable of transmitting their egg-laying powers to their offspring, except, of course, where the selection of birds for the breeding-pen has been conducted in a haphazard manner. In short, the egg-laying competitions have sounded the death-knell of the crossbred fowl.

BETTER MANAGEMENT DEMANDED.

While gratifying advance has taken place, there is still vast room for improvement. The desirable blood is procurable, but when indifferently bred and handled it may easily prove as unprofitable as any barnyard stock.

The great weakness is a lack of appreciation of the importance of proper housing. It is only on a comparatively few specialist plants where common-sense buildings are provided. These need not be elaborate structures, but they should be made in such a way that they are quite draught-proof and deep enough to warrant the front being practically open. While poultry to be kept in a condition to be able to produce their maximum capacity must be protected from all extremes of weather, they should have an abundance of fresh air both night and day. Then, to obtain eggs in the cold and dear seasons they should have ample dry scratching accommodation, so that they may be fed and exercised in comfort during bad weather. These requirements as to the housing of

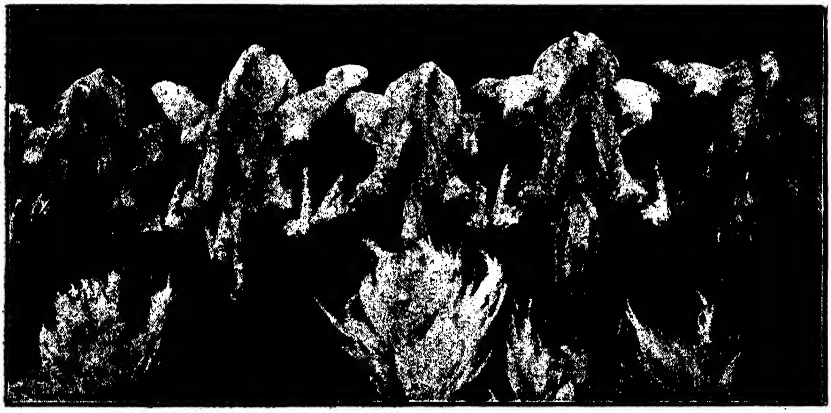


TABLE-POULTRY AS IT FREQUENTLY REACHES NEW ZEALAND MARKETS.

poultry are the vital essentials in the poultry world to-day, and not until farmers realize the fact will poultry be made the profitable side line to them it undoubtedly can be.

While greatly improved housing is the chief line of advance to be effected, reform is also needed in regard to feeding. The haphazard methods of feeding an ordinary flock will not do if the best results are to be obtained from high-type layers. The feeding must be systematic and liberal. In cold weather, meat, or a substitute, must be fed, and, wherever possible, this should be fed separately. Green stuff must also be liberally supplied, and where such a material as lucerne is available it may be used to bulk up the morning mash and thereby effect desired economy.

INCREASING POPULARITY OF GENERAL-PURPOSE TYPES.

The fact that the main activity in improving, by testing and selection, the egg-yielding standard has taken place in connection

with the White Leghorn has led to this breed being widely distributed throughout the Dominion. While the great merit of the strains of the White Leghorn we possess is undeniable, still it is a special-purpose breed, and the profit from it can be secured only through the egg-basket. Thus while the egg-yielding power of the poultry of the Dominion has been on the up grade the table quality has been declining, until at the present time dressed poultry of high quality is difficult to obtain; indeed, the amount available places it beyond the reach of the average consumer. It is interesting to recall the fact that fifteen years ago advocates of an export trade had only carcase poultry in their mind's eye, an egg-export not being considered within the realms of possibility.

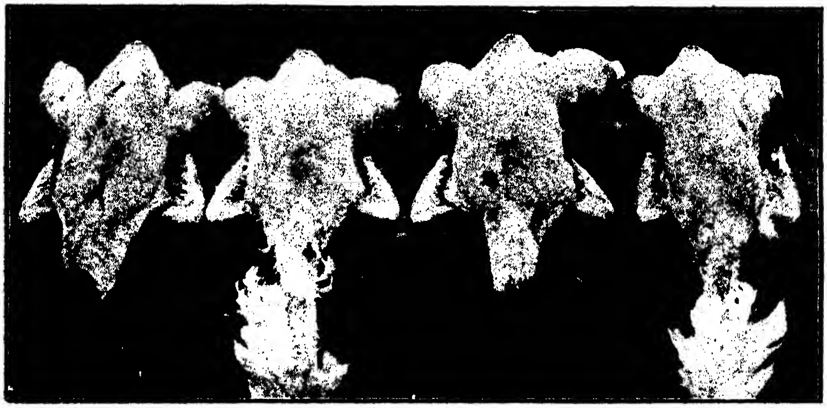


TABLE-POULTRY AS IT SHOULD BE MARKETED.

To-day we have a practical endeavour to establish an export trade in eggs, while the exportation of dressed poultry is farther off than ever.

While the White Leghorn may continue a profitable proposition to the specialist, there is no doubt that laying-strains of the more general-purpose types, such as the White Rock, the Black Orpington, and the Wyandottes, will prove a more profitable fowl to the farmer. Bred at the right time and housed and fed properly, these strains will furnish eggs in the dear season, while the cockerels will be worth the rearing—that is, if fed well as chickens and marketed before reaching an adult age. It was with the idea of encouraging farmers to adopt these general-utility breeds that the Department reduced the price of sittings of their eggs at its poultry plants. This policy has had a most gratifying result. It has been found impossible to supply the demand for sittings of Orpington, Rock, and Wyandotte breeds. We may therefore expect to see in the

immediate future an improved class of table-poultry offering on local markets. With improved quality poultrymen would be well advised to endeavour, through their organizations, to bring about the selling of poultry by weight. Given this much-needed reform the farmer would know just where he is, and would thereby be encouraged to adopt the most improved methods of production and marketing.

The Show Movement.

Whereas poultry shows up to a very few years ago were solely concerned in the exhibition of birds judged entirely according to show standards, there is now a gratifying tendency to include classes for utility stock—birds of a laying type, which combine with productive power the desired characteristics of their breed. Poultry shows are becoming of general interest and of greater educative value. Something more is required, however. Why should not incubators, brooders, and other modern devices to save labour and increase the output be exhibited at such fixtures? One or two progressive societies have initiated egg classes. Why should there not also be classes for dressed poultry, to be judged on up-to-date principles, so that exhibitors may not be encouraged to think that size is everything?

Money in Poultry.

But a few years ago it was a commonly held opinion that it was impossible to make poultry-keeping pay when conducted as an independent industry. Certainly at the present time there are many men who make a good living from the business, and a number of these are proving that it is possible to earn good money out of market eggs alone. In saying this it is not implied that poultry-keeping has at last been proved to be the get-rich-quick business so many have foolishly imagined. Indeed, those who find it profitable are exceptional men, who combine with capital and experience an enthusiasm for their work and that energy and eye for detail so necessary in poultry-management.

Artificial Rearing.

With the advance taking place in egg-yielding power, not only in Leghorns but in the general-purpose breeds now coming into favour, the brooding propensity is being proportionately reduced. This, and the necessity of breeding the layer out of its natural season and in good numbers at a particular period, makes it imperative to adopt artificial hatching and rearing. The farmer—and his wife and daughter—must accept this principle if they would make the poultry really profitable. With a good brand of

incubator and a fireless brooder (properly protected from extremes of weather) they would find the little study and special attention required to manage these appliances successfully well repaid. The adoption of artificial chick-production on the farm is one of the reforms I hope to see initiated on a comprehensive scale in the near future.

DAY-OLD CHICKS.

The development of the business of supplying day-old chicks has been quite remarkable. A good number of noted breeders of utility stock are making the day-old chick a feature of their business, and they are finding it profitable. The purchaser is also apparently well satisfied with the arrangement. The chicks reach him in good condition, benefiting by the fact that they have the desired natural rest from artificial food for the first few days. The system has much to recommend it, and where a reputable breeder whose stock is known to be vigorous and profitable is patronized the purchase of day-old chicks should prove an economical method of establishing a flock. With the introduction of larger types of incubators by specialist breeders no doubt the cost of the day-old chick will be reduced to a point at which it will even pay the farmer or poultryman to supplement his flock by this means from year to year.

CO-OPERATION.

It is gratifying to know that good progress has been made of late years in regard to the co-operative marketing of eggs, a good example being provided in this connection by the Masterton Egg Circle. In due course, no doubt, an extension of this excellent principle to include the collection, fattening, and marketing of prime table-poultry will not only enable the poultryman to cater to the city consumer in a proper manner, and incidentally encourage the consumption of poultry products, but will give him the full market benefit from his enterprise. A number of progressive poultrymen in Christchurch—members of the Canterbury Egg-farmers' Association—took early advantage of the demonstration provided by the Department to prove the feasibility of exporting eggs to distant overseas markets. They viewed the matter in the right light, and adopted exactly the same procedure as the Department in packing and shipping their eggs, realizing as they did that the most thorough methods are necessary in catering to such a trade. Though the Christchurch society received some support from individual breeders in Canterbury and other districts, large enough consignments could not, unfortunately, be secured to fill the cool chambers provided by the shipping company during the best marketing period. The

space provided for the first shipment was, however, filled, three hundred-odd cases, containing thirty dozen each, being duly shipped to the Vancouver market. The returns should be payable, while the fact that a large number of eggs have been sent out of the country will undoubtedly have a strengthening effect on local markets. Eggs produced in the winter months invariably realize profitable returns, but it is the product of the more favourable periods for egg-production which often have to be sold at a poor margin of profit. The export of these is therefore most desirable, providing always that they have not to risk a non-payable market abroad. As in all other commodities, it is a matter of supply and demand. If we have an oversupply, exportation removes the surplus and provides sufficient eggs to meet the local demand at a price which will be really payable. A fact to be remembered in comparing winter and summer egg prices is that it is cheaper to produce eggs in the natural laying season of fowls, and therefore eggs in winter at, say, 2s. may not be so profitable as summer eggs at 1s. 3d.

GOOD CO-OPERATIVE MOVEMENT.

There has just been formed a co-operative organization to market poultry products in the City of Wellington in an up-to-date manner —the New Zealand Poultry Industries (Limited). It will have the handling of the eggs of all the egg circles in the Wellington Province. A feature of the company's business will be the guaranteeing of the quality of all products sold, while cool storage will be availed of to regulate the supplies of eggs and poultry throughout the year.

THE FUTURE.

While there are many indications to encourage the belief that poultry-keeping in this country is being placed on a much improved basis, it is not to be thought that it is being rendered so simple a procedure that any one can make a success of it. Experience is demanded more than ever before, and the necessary capital is imperative to provide good stock and the proper housing of it.

THINGS TO REMEMBER.

In warm weather more than at any other time the fight against vermin must be continuous.

Separate the sexes as early as possible, and cull out all weaklings. It never pays to rear a bird lacking in vigour.

Give the perches, especially underneath and at the ends, a good application of a mixture of kerosene and sulphur emulsified with fat.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtainable from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith.

SOWING PERMANENT PASTURE.

MR. H. T. ROBINSON, Whitianga :—

I put a couple of acres in oats last autumn for green feed. After the oats were eaten off two or three times I ploughed them in and put it down in maize, for green feed. Would it be advisable for me to take another crop of oats off it after the maize is cut before putting in permanent grass, or would it impoverish the soil too much ?

The Fields and Experimental Farms Division :—

It would not be advisable to take another crop of oats off the land in question before laying it down in pasture. Permanent grasses should, if possible, follow a crop that has been fed off.

GRASSES AND CLOVERS.

MR. S. EYRE BAXTER, Taikawhana :—

1. Is *Bromus Schraderi* the same grass as *Bromus unioloides*, or prairie-grass ?
2. Can you give any information about Soya beans ? Will they grow here, and can the seed be obtained ?
3. Also cow-peas ?
4. Do you know anything of the following clovers : (*a*) Strawberry clover, (*b*) Japan clover, (*c*) Egyptian clover ?
5. Would *Bromus inermis* be a good grass for sowing on bush burns ?

The Fields and Experimental Farms Division :—

1. Yes.
2. Soya beans were grown in various parts of New Zealand last season, but were not generally successful. It is possible that the varieties most suitable to the New Zealand climate were not tried. Small quantities will again be tried this year. The seed is stocked in small quantities by some seedsmen.
3. Cow-peas have been tried in various parts of New Zealand but with poor success in the South Island. Better results have been obtained in the North Island, but their cultivation has not been generally successful.
4. (*a*.) This clover usually grows well in the Auckland District, and produces a large quantity of feed in the spring. (*b*.) This is not thought to be a true clover. Probably its greatest utility will be for ploughing in as green manure. (*c*.) Also known as "Berseem clover," and so far has only been tried experimentally. It is found to be an exceedingly light cropper, and did not exhibit permanency.
5. *Bromus inermis* would be suitable for bush burns.

LUCERNE.—TWO-HORSE DIGGER.

MR. GEORGE EMTAGE, Motu Ora Island :—

1. How far apart in the row should lucerne-plants stand ?
2. Is there a two-horse digger made ? If so, what does it usually cost ?

The Fields and Experimental Farms Division :—

1. In New Zealand lucerne-plants are not usually singled in the rows, but are permitted to grow as the seed is sown. If, however, you are able to give this attention, it would be extremely desirable that the plants should not be closer than 6 in.

2. The usual digger is a two-furrow plough, requiring four horses. Implement-makers in the South Island advise that a single digger is sold at £15. It must, however, be remembered that if this is used for a deep furrow more than two horses will be necessary.

GUM-TREES.

" INQUIRER," Omihi :—

Something has attacked my gum-trees. The bark has a lot of perforations on it. Could you kindly tell me what is wrong, and how to treat it ? My trees are about a mile from any other gum-trees.

The Orchards, Gardens, and Apiaries Division :—

The gum-trees have apparently been attacked by a native Australian beetle. The larva is a sticky green grub, which feeds on the leaves of the trees, but so far in New Zealand the damage, though disfiguring, has not been very serious. If the trees are large, it is, of course, not possible to take any mechanical means of repression, such as spraying; but if the trees are all young, spraying with arsenate of lead will certainly control the pest.

GRASS FOR IDENTIFICATION.

MR. ERNEST R. ROBERTS, Westport :—

Would you kindly tell me the name of the enclosed grass, if you recommend it for dairy feeding, and if the same grass would have to be sown annually ?

The Fields and Experimental Farms Division :—

The grass sent is sweet vernal (*Anthoxanthum odoratum*), a valueless grass which is only too common in many pastures. It is never sown in New Zealand, but is a common impurity of many agricultural seeds.

DEPRAVED APPETITE IN CATTLE.—BLOOD IN COW'S MILK.

MR. G. H. WILBY, Prebbleton, Canterbury :—

1. What is the cause of cows eating bones when they have plenty of rock salt accessible ?

2. I had a cow lately come to her third calf, and although she was all right on previous occasions, this time her milk was mixed with blood. What is the cause ? Is there any preventive or cure ?

The Live-stock and Meat Division :—

1. Depraved appetite, or, as it is technically termed, " pica," is often seen in cattle. They will chew bones, old leather, and all manner of things. They will often be seen licking at clay banks, old stumps, and also the clothes of their attendants. In many cases, if they can get at them, they will chew and swallow linen and cotton goods hung in drying-grounds. Often this unnatural craving appears to be purely and simply a habit, the animal apparently being in good

health. It may, however, lead to serious consequences: thus, if bones and suchlike are swallowed they may lie in the first stomach for a long time, setting up a condition of chronic indigestion. If a cow will swallow one article like this she will swallow others, and you never can tell what sort of a collection she has in her rumen. Again, clothes often have pins or needles left in them, and, if swallowed, being sharp-pointed, may make their way to the heart and set up pericarditis, which invariably leads to the death of the animal. The cause of this unnatural craving is not well understood, but it may be put down to a want of something necessary to the animal economy which she is endeavouring to supply herself with. It is often seen in cows in the later stages of pregnancy. Here the extra drain put upon the animal in order to furnish salts, &c., for the nourishment of the fœtus may be the cause. While it is usually only seen in one or two cows in a herd, it may affect the whole lot of them, or even the whole of the cattle in a district. On the Continent of Europe and in America whole areas are subject to the condition appearing in the animals grazing on them. Here the cause of the condition is put down to deficiency of lime and phosphates in the soil, not only in those soils naturally wanting in these, but also where they have been exhausted by repeated cropping and where no compensation has been returned to the land in the form of manure. Light sandy and peaty organic soils are those upon which cattle are mostly affected. In treating animals, see that the grazing-pastures are kept free from such articles as the cows are likely to pick up, and, if necessary, a top-dressing of such an artificial manure as basic slag should be applied to them. Individual cows should have a mild purgative to begin with. A drench composed of 12 oz. of Epsom salts, with 1 oz. each of powdered ginger and gentian, may be given in a quart of thin oatmeal gruel. The animals, if at grass, should be given some extra food; and bran, which contains a good percentage of phosphoric acid, is one of the best and cheapest. It may be given in a daily meal with oat-chaff, every other day or so mixing ½ oz. of phosphate of lime with the meal. It would naturally be thought, seeing the animals are usually so fond of chewing bones, that bone-meal would be a good thing to give them. Experience, however, shows that it does little good. Cattle are herbivorous, and while the gelatine and fatty matter of the bones may be acted upon and absorbed, the earthy salts are passed through the alimentary canal practically unchanged.

2. The cause of blood being mixed with the milk is generally due to rupture of small blood-vessels in the lining membrane of the udder-ducts. It is usually seen in heavy milkers where there is an enormous determination of blood to the gland, and is often seen where the cow calves a day or two before her time. Owing to the arrangement for the elaboration of the milk not being complete, some of the small vessels give way under the strain. Treatment consists in giving a laxative drench and keeping the udder well milked out, being as careful as possible in doing so. We do not advocate any local treatment for the udder. The condition usually passes off in two or three days.

CULTIVATION OF KALE.

MR. THOMAS KEANE, Ararimu:—

What is the best time to sow kale for green feed in the autumn, and what are the most suitable manures?

The Fields and Experimental Farms Division:—

It is difficult to decide as to the best time to sow, so much depends upon the season and the soil. If required for late feeding, it would not be advisable to sow till somewhat late in the season. Thousand-headed kale, however, does not show its true character until it has been growing for some months, and has been eaten back and allowed to make a second growth. If this variety were grown moderately thin in drills of, say, 21 in. apart, eaten back, and then intercultivated between the drills, there is no doubt that a very large amount of feed could be obtained during the winter months.

The following mixture might be found suitable, but it is difficult to advise re a mixture without knowing more about the soil. The quantities are quoted at per hundredweight: Superphosphate, 45 lb.; bone-meal, 56 lb.; sulphate of potash, 11 lb.

DISEASE OF PEACH-TREE.

MR. G. H. STREIFF, Taupiri :—

What disease is the enclosed cutting from a peach-tree affected with, and how should it be treated ? The trees in question were covered with blossoms and young leaves all starting to shoot. Soon, however, the leaves started to blacken and wither, and for all the blossoms that were on the trees there is hardly a single young peach showing, and the trees are practically destitute of leaves.

The Orchards, Gardens, and Apiaries Division :—

The peach-tree specimen submitted is badly attacked by a fungus disease known as peach-curl (*Exoascus deformans*). To control this disease the peach-trees should be thoroughly sprayed in the autumn when all leaves have fallen with the 10-10-40 formula of the Bordeaux mixture, and again with the same mixture in the early spring when the buds are beginning to swell. Owing to the tender nature of peach-leaves it is not advisable to spray with the Bordeaux mixture at this time of the year.

BUTTERMAKING ON THE FARM.

" INQUIRER " :—

I have your leaflet, " Buttermaking on the Farm," and try to follow the instructions therein *re* working the butter. I roll up and work in the butter-worker ten or twelve times, each time working to get all the moisture out. The butter, though of excellent flavour and keeping-quality, is often inclined to be soft and does not cut clean, but is more sticky than it should be. Would you kindly say if you think it due to too much working ?

The Dairy-produce Division :—

The soft and sticky nature of the butter, of which you complain, is due, no doubt, to overworking and to some extent to the temperature at which the butter is treated. There is no need to continue the working process until the moisture-content is reduced, for the only object of working butter, after all, is to make the colour even and to bring the product into a solid and compact mass. By cooling the cream as low as possible before churning, washing the butter with cold water, and giving a normal amount of working the trouble should be entirely overcome.

WOOD-LICE.

MR. A. F. BAYLY, Lower Hutt :—

My annuals are being eaten off (under glass) by wood-lice. What is the best way to get rid of this pest ?

The Orchards, Gardens, and Apiaries Division :—

Frequently disturbing the soil will cause wood-lice to disappear. Water near boiling-point kills them instantly, but when hot water cannot be used a teaspoonful of Condy's crystals dissolved in a gallon of cold water will kill them without injuring the plants.

FOOD VALUES OF POLLARD AND SHARPS.

MR. A. B. MATTHEWS, New Plymouth :—

Could you inform me whether there is any difference in the food values of pollard and of sharps ?

The Live-stock and Meat Division :—

By " pollard " we presume you mean what are known as coarse sharps, and by " sharps " what are known as fine wheat middlings or sharps. Terms applied

to the by-products in the manufacture of flour vary in different countries, and also as to whether the process of grinding is by the old-fashioned stones or by the modern roller system. The following table gives the most recent analysis available of the chemical composition of the two substances, that of bran being also given. It will be noted that the two products are very similar in composition, pollard containing more woody matter or fibre and a little more oil, while the "sharps" contain more starchy matter or carbohydrates.

	Total Dry Matter.	Crude Albuminoids.	Oil.	Carbohydrates.	Fibre.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Pollard	88	15	4½	57	8
Sharps	88	15	3½	62	5
Bran	87	14	4	56	9

The digestible percentage and albuminoid ratio is—

	True Albuminoids.	Oil.	Carbohydrates and Fibre.	Albuminoid Ratio.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Pollard..	12	4	53	5
Sharps	12	3	56	5½
Bran	10	3	45	5½

From this it would appear that the albuminoid ratio in digestible matter is slightly higher in sharps than in pollard. The price is also higher by about 10s. per ton.

Poisoning Wild Pigs.

"Iki Iki," Waerenga:—

Can you tell us of some method of poisoning wild pigs, which are causing considerable damage to our grass land? The country is hilly bush clearing. Would the poisoned pigs be a lasting danger to the sheep-dogs?

The Live-stock and Meat Division:—

Yes, there would be danger if the poison used were such substances as arsenic or phosphorus. It would be better, if possible, to shoot the pigs.

Tutu Poisoning in Cattle.

Mr. James Smith, Waverley:—

Would you kindly advise me of the treatment for tutu poisoning in cattle?

The Live-stock and Meat Division:—

It is often a very difficult matter to apply medicinal treatment to animals suffering from tutu poisoning, seeing that the trouble causes more or less severe brain symptoms, which render the animal intractable and difficult to handle. Very useful treatment for this trouble, when it can be applied, is the internal administration of liquid ammonia or carbonate of ammonia mixed with milk or thin gruel if possible; in addition a large dose of linseed-oil, not less than 2 pints, should be given. The dose of liquid ammonia in cases such as this should be 1 oz. in a quart of milk or thin gruel. If neither of these be available it should be mixed with the 2 pints of linseed-oil which is recommended above. Liquid ammonia is irritating to the membrane of the mouth and throat, hence the necessity for diluting it with a quantity of some demulcent fluid. It should be borne in mind that there are two liquid preparations of ammonia—one a very strong preparation, known as liquor ammonia fort.; the other the ordinary liquid ammonia, which is here recommended. If carbonate of ammonia be used in cases of tutu poisoning, the dose is 1½ oz.

If the rumen (first stomach) is greatly distended with gas, relief can be afforded by puncturing it at a spot midway between the haunch-bone and the last rib. This should be done on the left side of the animal. Really the best instrument for so puncturing is that known as a trocar, fitted into a canula. This is a round, sharp-

pointed instrument with a metal tube (the canula) fitting tightly over it. After making the puncture the instrument is withdrawn, and the tube left in, thus allowing the continued escape of gas. It is unlikely, however, that the farmer will have this instrument at hand, and in an emergency a sharp-pointed knife with a long but thin blade can be used. In this case, however, it must not be simply plunged in and withdrawn, but must be held in position after making the puncture, the blade being twisted slightly sideways, thus maintaining an opening through which the gas can escape from the rumen. Owing to the usually excited condition of affected animals, however, it is often very difficult to do this. It is usually travelling stock which become the victims of tutu poisoning; and feeding on the plant undoubtedly causes much more trouble when taken on a more or less empty stomach.

The poison contained in the tutu-plant is an alkaloid known as tutin, this being the active principle of the plant. Full particulars concerning this aspect of the question can be obtained from the Annual Report for the year 1908, in which a description of tutin is given by Mr. Aston, Agricultural Chemist. A copy of the report has been forwarded to your address.

POISONING RABBITS.

MR. A. F. BAYLY, Lower Hutt :—

I have some rabbits that are rather troublesome in my garden, eating things off, &c. What kind of poison would you advise me to use, and how would you apply it? Is poisoned wheat any good? I have a rabbit-trap; what bait would you advise to attract the rabbits?

The Fields and Experimental Farms Division :—

We would advise the use of phosphorized pollard poison. A small quantity of this could be procured from the Department of Agriculture, &c., Masterton, at 4d. per pound. Poisoned wheat might be effective, but it is not to be relied on. No bait is used with a rabbit-trap. Practice is required in the setting of this, which is done by taking out a cut in the land the size of the trap. Set the trap and place it in this cut, covering it over carefully with fine earth to represent an ordinary scrape. This attracts the animal, and in the course of its investigations it probably springs the trap and is caught. The better plan would be to erect wire netting round the garden.

RUPTURE OF DRAUGHT COLT FOAL.

MR. JOSEPH BRAITHWAITE, Matakana, Auckland :—

I have a draught colt foal a week old, which was born with a rupture in the testicle-bag. The rupture is about the size of a man's fist, and you can feel the gut in his bag. Would it be possible to castrate him without letting the gut out, and, if so, would it be advisable to operate now, or leave him alone for a year or more? There is no veterinarian within a reasonable distance.

The Live-stock and Meat Division :—

Your foal has apparently got what is termed *inguinal hernia*. In the majority of these cases the bowel is drawn up into the abdomen as development proceeds—nature practically providing the cure by the contraction of the internal inguinal ring. It is, therefore, no advantage to castrate at present, but better to let the foal have a chance, and operate in a year's time. The operation then, whether the bowel is present or not, should be what is termed the "covered" one, and should be performed by a veterinary surgeon. Even if the bowel is not present in the scrotum at the time of operation, it has been there once, and is liable to come down again. The only thing you have to fear in these cases—and it would occur whether the foal was castrated or not—is possible strangulation of the bowel. The symptoms would be those of abdominal pain generally—colic. Treatment would consist of throwing the foal and placing him upon his back, when gentle manipulation of the parts would return the bowel into the abdominal cavity. It would be as well to halter and handle your foal from time to time, in order that he be sufficiently tractable should such an occasion arise.

Shelter-trees.

R. H. W., Lichfield, Waikato :—

What is the best method of raising shelter-trees from seed—pines, gums, larch, &c. ?

The Orchards, Gardens, and Apiaries Division :—

Full particulars of the best methods of raising shelter-trees, &c., from seed are given in the publication "Tree-culture in New Zealand," by Henry J. Matthews, procurable from the Lands Department, Wellington, price 2s. 6d. This book contains very valuable information on tree-planting for timber, shelter, and ornamental purposes.

Pine-needles.

"Insignis," Lincoln Road, Henderson :—

What effect would the fallen pine-needles have upon the soil ? Some farmers hold that they have a certain manurial value, while others contend that pine-needles cause that mildewed appearance in the soil when turned up near the trees.

The Director of Orchards, Gardens, and Apiaries Division :—

Pine-needles under some conditions appear to have a deleterious effect upon the soil, and should therefore not be used as a manure.

Tares.

"Southland," 31 Ross Street, Roslyn, Dunedin :—

Do you know whether the real winter tares are obtainable in New Zealand ? I tried to get them in Dunedin some time ago, but could not, and had to try 6 bushels of some other kind. Also say, if they are likely to be got, if you think they would ripen in Southland if sown in spring, and others be ready to sow next autumn, as, of course, we cannot afford to buy tares at 10s. a bushel to sow 20 to 40 acres.

The Fields and Experimental Farms Division :—

Seed of winter tares can be obtained from Messrs. Wright, Stephenson, and Co., Dunedin, or from any reputable seed-merchant. If weather be favourable tares should ripen in Southland if sown in spring, but it would depend entirely upon the season.

Vegetable-culture.

"Desert," Spreydon :—

In my vegetable-garden is a piece of ground in which it seems impossible to get anything to grow. There are some *Pinus insignis* not very far off, but still not very near. I have tried tomatoes, leeks, turnips, pumpkins, and melons, but without success : they start all right, but afterwards shrivel up. The soil is good and well manured, but seems loose, and retains no moisture. Would you please inform me (1) what I could grow there, and (2) if you think it would be any good trying potatoes.

The Director of Orchards, Gardens, and Apiaries Division :—

It is probable that the roots of the *Pinus insignis* rob the soil of plant-food and moisture to such an extent that the plants mentioned have failed to succeed. It would be as well to apply to the Orchard Instructor of the district (Mr. W. J. Courtier, Christchurch) for a personal visit and advice.

PINE-NEEDLES.—SULPHATE OF IRON.

"W. AUCKLAND," Takapuna :—

1. Some few years ago I had a number of pine-trees cut down (*Pinus insignis*), and they are now crumbling away. Would the remains be of any value as a dressing for fruit-trees ?

2. We read a great deal about humus being necessary as plant-food : would not that take its place ?

3. Are pine-needles any good as a mulch for fruit-trees in summer, or are they detrimental ?

4. A bag of sulphate of iron has come into my possession : is it of use for garden, orchard, or paddocks ?

The Orchards, Gardens, and Apiaries Division replies,—

1, 2. It is not at all advisable to apply the decayed remains of the *Pinus insignis* trees as a dressing round fruit-trees, owing to the great risk of introducing fungus disease.

3. Pine-needles are not recommended as a mulch.

4. Sulphate of iron would be beneficial applied to the soil over the fibrous roots of fruit-trees and lightly forked in at the rate of from 2 lb. to 4 lb. per tree, according to the size of the trees.

FEEDING CALVES.

MRS. M. S. RUTHERFORD, Marlborough :—

Is separated milk fed to calves directly it is separated and warm harmful for them ? We take the froth from the top.

The Live-stock and Meat Division,—

No. It is about the best time to give it to them.

NOTICE TO SUBSCRIBERS.

THE attention of subscribers is drawn to the fact that complete general indexes for Volumes i, ii, iii, iv, and v of the *Journal* may be obtained on application. A nominal charge of 3d. will be made for each index.

If desired, subscribers may arrange to receive the volume indexes as they are issued, and payment of an extra 6d. could then be made at the time of remitting the annual subscription.

The Department has now reduced the charge for bound volumes of the *Journal* from 5s. 6d. to 4s. 6d.

Following are particulars of postal notes received from subscribers without any further enclosure: No. 833041, 5s., issued at Ohakune; No. 368242, 2s. 6d., Blackstone Hill; No. 398776, 2s. 6d., Te Aroha. The senders are requested to communicate their names and addresses to the Secretary, Department of Agriculture, Industries, and Commerce, Wellington.

THE WEATHER FOR NOVEMBER.

D. C. Bates.

The weather in November just passed has been remarkably similar to that experienced in the same month of last year. As in the previous November, so in this, there was an almost total absence of well-developed anticyclones, and the numerous depressions, which accounted for the lack of settled conditions, were not unlike those in November, 1912, both as regards type and intensity.

Between the 19th and the 23rd fair weather generally prevailed, but during the remainder of the month dull and unsettled conditions were the rule.

The most unfavourable conditions were experienced about the 6th, the 18th, and during the last week, the disturbing cause in each case being a westerly area of low pressure, those passing on the 6th and 18th being apparently of a cyclonic nature.

Precipitation was considerably above the average throughout the Dominion.

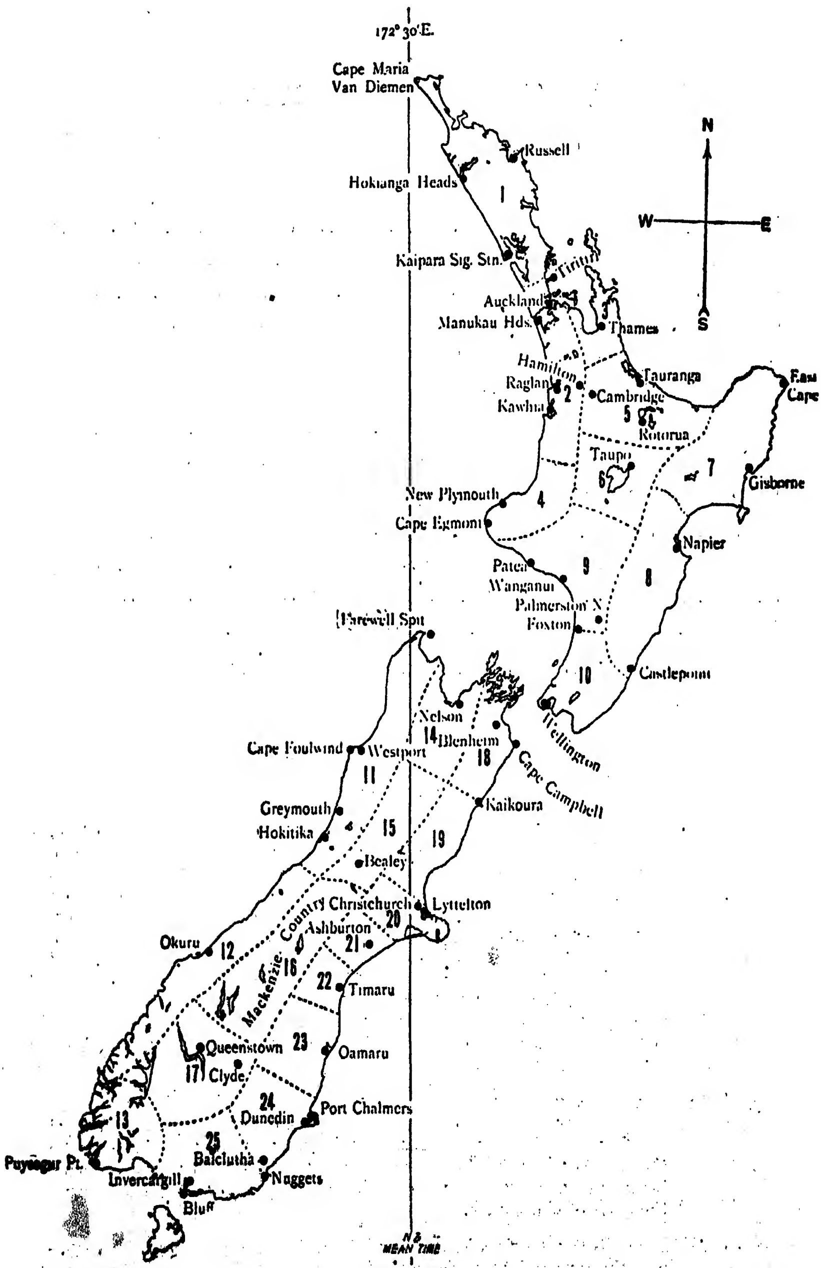
DISTRICT NOTES.

District. *Chiefly from Telegraphic Reports.*

1–6. The total month's rainfall was everywhere greatly in excess of the average, the difference ranging considerably even in the same districts. In some cases more than double the average was recorded. Precipitation was mostly in the nature of heavy showers, but there were cases when continuous rains brought the day's fall above the 1 in. mark. Thunderstorms were experienced on several occasions, and on the night of the 9th Waihi reported an exceptionaly severe one, lasting all night, and accounting for a fall of 4·72 in. of rain. On the afternoon and evening of the 25th fierce squalls passed over the North Island. At Auckland a considerable amount of damage resulted. The month as a whole was very unsettled, and the last few days were remarkable for continuous strong westerly winds.

7, 8. In district No. 7 a few stations report slightly less than the mean, but usually the rainfall was much above. Between the 19th and the 23rd weather-conditions proved very fair, but during the rest of the month the weather was changeable and showery. A thunderstorm occurred in many parts of the 1st, and electrical conditions were frequent towards the close of the month.

9, 10. As in most other districts in the North Island, dull and unsettled weather was the predominating feature of the month. The total rainfall was above the average by about 20 per cent. Very boisterous weather prevailed from the 23rd to the close of the month, but most of the rain fell during the night-hours.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Foxton
Castlepoint
Wellington
Farewell Spit
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Blenheim
Cape Campbell
Kaikoura
Cape Foulwind
Westport
Greymouth
Hokitika
Bealey
Christchurch
Lyttelton
Ashburton
Mackenzie Country
Timaru
Okuru
Queenstown
Clyde
Oamaru
Dunedin
Port Chalmers
Balclutha
Nuggets
Puysegur Pt.
Invercargill
Bluff
N.Z. MEAN TIME

District.

11–13. Generally the rainfall was about the normal, or only slightly in excess. The heaviest falls occurred in the last few days, when over an inch was measured on several days. Although there was a considerable amount of dull weather there were several periods of fair weather.

14, 18. An excessive rainfall was experienced, and sunshine was under the average.

15–17. Most stations reported "a very wet month," the difference from the mean being in all cases positive.

18–23. All the east coast districts had more than the mean rainfall, the percentage above averaging about 50 per cent. The month was characterized by cold, wet, and dull weather.

24, 25. With the exception of a few isolated stations the total rainfall was slightly above the mean. Dull and showery weather prevailed.

At the Ruakura Farm of Instruction a small area sown with Western Wolths seed saved on the farm looks excellent.

The first crop of lucerne at the Ruakura Farm of Instruction was mown on the 7th October, and, the weather being unsuitable for hay, it was converted into silage.

At the experiment station for the sugar industry at Prague a series of experiments have been conducted to demonstrate the effect of flowers of sulphur on sugar-beet. The experiments, which are still in an inconclusive stage, indicated a decided improvement from the weight point of view from the use of the sulphur.

Agricultural Show Dates.—Te Aroha Agricultural and Pastoral Association, 28th and 29th January, 1914; Marton District Agricultural and Pastoral Association, 11th February, 1914; Dannevirke District Agricultural and Pastoral Association, 11th and 12th February, 1914; Masterton Agricultural and Pastoral Association, 17th and 18th February, 1914.

The permanent manurial paddock at the Ruakura Farm of Instruction is in an exceptionally interesting stage. Strange to say, the superphosphate applied to the swede crop last year, judging by the present appearance of the oat crop, has left a greater residue behind than any of the other manures or mixtures, which would seem to prove that a highly soluble phosphate is not wasted or washed out of the soil, but that the unexhausted residue becomes fixed. The cross-dressing of lime, which gave no results in the swede crop, is now proving beneficial.

THE FRUIT CROP.

THE officers of the Orchards, Gardens, and Apiaries Division report as follows on the condition of the fruit crop at the end of November:—

AUCKLAND NORTH.—Apples: Have set well, and promise crop above average. Cherries: Very fair crop; regret first severe attack of cherry-scorch has to be reported. Lemons: Have a good healthy appearance. Nectarines: Average crop promised. Peaches: Crop promise is above average. Pears: Generally below average. Plums: Have generally not set so well as promised. Plums (Japanese): Have not set generally so well as promised; crop is below average. Strawberries: Good average crop; high winds and heavy rain did certain amount of damage, but growers will benefit later. Tomatoes: Doing well generally; *Phytophthora infestans* rather prevalent where spraying not thoroughly done.—*W. C. Thompson.*

AUCKLAND SOUTH.—This month has been wet and boisterous, and a great deal of damage has been done to apricots and plums, in some instances practically all the fruit being blown from the trees. Thames growers state that this is the worst wind they have known for a long time. The first apricots and plums—Breda (or Musch Musch) and Evans Early respectively—were sent to market on the 15th, but a few (not sufficient for market) were ready on the 11th. The first of the Newcastles were sent on the 20th. Tomatoes up to the present have escaped blight, and the plants are looking exceedingly well, the fruit being well forward: these plants, being generally in sheltered positions, escaped the severe buffeting other plants received.—*N. R. Pierce.*

HAMILTON.—Apples: All varieties cropping well; scab rather prevalent on many varieties; wet weather has hindered spraying operations. Apricots: Very light crops. Cherries: Good crops where grown; ripening very satisfactorily. Gooseberries: Crops fully up to expectations. Lemons: Rather scarce; trees blooming profusely. Nectarines: Developing rapidly. Peaches: Fairly good crops may be expected. Pears: Crops medium to fair, showing effects of scab-infection. Plums: Medium crops expected. Plums (Japanese): Crops very light. Strawberries: Still in fair supply; recent rains have prolonged the cropping period. Tomatoes: Looking very well; showing traces of blight in many localities.—*T. E. Rodda.*

MANAWATU AND WAIRARAPA.—Apples: Good crop almost all varieties; scab beginning to show up, the weather about the middle of the month being very favourable for germination of spores; powdery mildew very bad in some parts, no doubt owing to climatic conditions. Apricots: Poor crop, owing to frost. Cherries: Good crop; heavy winds and rains during last week in November did considerable damage, causing much dropping and cracking. Gooseberries: Good average crop. Nectarines and peaches: On the whole a very good crop; high winds thinned out a lot during the last week, but still good crop remains. Pears: Heavy crop of all varieties may be expected; black-spot not quite so prevalent as last season. Plums (English and Japanese): Very medium crops, owing to frosts. Tomatoes: Very good, both indoor and outside planting; practically no trouble from fungus diseases as yet.—*George Stratford.*

WANGANUI.—Apple and pear crops progressing satisfactorily. Peaches: First earlies about ready for picking. Plums: Considerable quantity of early varieties now on the market. Cherries: Now being marketed at satisfactory prices. Gooseberries: A large crop now being picked. Tomatoes: Some good crops under glass now being gathered; where spraying has not been systematic fungus blights giving some trouble. During the last few days weather has been wet and boisterous, depreciating to some extent berry and stone fruits.—*W. C. Hyde.*

WELLINGTON.—Apples: A good crop. Apricots: Poor. Cherries: Fair crop. Gooseberries: Large crop. Nectarines: Poor crop. Peaches: Fair crop; black

aphis and peach-curl are in evidence and causing trouble. Pears: Poor crop where frosts damaged the fruit. Plums: Good average crop. Raspberries: Fair crop; some rods damaged by the wind. Strawberries: Poor, and not planted extensively. Tomatoes: Large areas planted outside, and looking well; indoor are being marketed and retailed at 2s. per pound; owing to difficulty growers have in obtaining suitable lime the foliage in some cases was badly burned.—*T. C. Webb, jun.*

Nelson.—Apples: Present indications point to a normal crop, though the blossoming period indicated an extraordinary one; powdery mildew has affected the Jonathan crop very materially, and other varieties to a lesser extent. Apricots: Can now be safely estimated as a very good crop, and looking well. Cherries: Now being picked and turning out very well, but in many instances are not too good quality owing to much wet. Gooseberries: Turning out a heavy crop of fine berries. Nectarines and peaches: As stated in last report, promise on the whole a good crop. Pears: Good crop on the whole; Williams's Bon Chretien heavy in most places. Plums: Few cherry-plums now being picked; good crop of these, and the same may be said of most other sorts. Plums (Japanese): These will be a better crop than I expected to see. Raspberries: These are looking well and blossoming profusely; with seasonable weather should be a heavy yield. Strawberries: Good crop, but too much rain to secure the best results. Tomatoes: In the drier places doing very well, but blight has made its appearance in many plots. Walnuts: Plenty of nuts, but badly affected with bacteriosis. This month has been very unseasonable during the last three weeks: a great deal of rain has fallen and high winds have prevailed, keeping the ground saturated and greatly retarding spraying operations. In the Riwaka district many fruit-trees were blown down and others have a decided list, owing to a heavy wind on the 17th instant. Apple-scab has spread rapidly during the last fortnight, Sturmers coming in for a good deal of attention by this fungus. Many orchards suffering badly from the powdery mildew; also, Bordeaux mixture is responsible for some amount of burning this season, both fruit and foliage suffering, owing probably to unusual climatic conditions. Lime-sulphur has done damage in a few instances also, but is reported on very favourably by others. I have noticed several instances where the codlin-moth has been at work, and spraying is now general with arsenate of lead.—*J. H. Thorp.*

Blenheim.—All fruit with the exception of plums has set well. Spraying with arsenate of lead for the control of codlin-moth is in full swing now. A few early varieties of cherries are being gathered.—*B. G. Goodwin.*

North Canterbury and West Coast.—Apples: Fair to good, some varieties having fallen a good deal since last report. Apricots: Light crop. Cherries: Medium. Currants: Good to fair. Gooseberries: Good. Grapes (indoor): Expect good crop; looking exceptionally well. Grapes (outdoor): Fair. Nectarines: Fair crop. Peaches: Fair crop. Pears: Pear crop inclined to be light, having dropped badly during the month. Plums: Fair crop. Plums (Japanese): Light. Quinces: Fair crop. Raspberries: Good crop. Strawberries: Good crop. Tomatoes: Good crop; looking well. Walnuts: Inclined to be light. The weather during the last month has been very erratic, being very squally and unsettled, making it most difficult for carrying out spraying operations, being ideal weather for the development of fungoid diseases.—*W. J. Courtier.*

Christchurch and Suburbs.—Apples: Fruit fell heavily during month; only a medium crop; considerable russeting where combined spray used. Apricots: Nothing to harvest. Cherries: Harvesting early varieties; crop up to the average. Gooseberries: A few being picked; will be a short crop. Pears: Set well, but fell heavily during month; late varieties poor crop, early and mid-season medium crop. Plums: Average crop. Raspberries: Setting well and filling out nicely; many still producing flowers. Strawberries: Average crop. Tomatoes: Promise of a good season for indoor growers; fruit well advanced and setting well. This month should see the markets well supplied. Diseases not yet troublesome.—*G. Esam.*

Timaru.—Apples: Good crops have set, well up to last month's estimate of 70 per cent.; Sturmer, Jonathan, Cox's Orange Pippin, and Rokewood varieties are easily first for best crops. Apricots: Shot-hole fungus has been bad, and crops have thinned in consequence; in the Waitaki valley the bronze beetle has caused damage to the foliage; spraying with arsenate of lead has been advocated as a controlling agency; trees that had been winter-sprayed with lime-sulphur

mixture (home-made) show the least amount of damage from shot-hole. Cherries: Good crops of early sorts are being gathered, though the brown rot has caused a lot to fall; have advocated spraying with hellebore powder to control pear-slug where fruit has not been gathered. Gooseberries: This fruit is being gathered, and the berries, owing to the good season, are well filled. Peaches: Where spraying has been neglected or poorly applied curly leaf is in evidence; contrary to my former expectations, they are holding up well; black aphis still continues to give trouble. Pears: May be regarded as a subnormal crop, and black-spot, which is in evidence, may be calculated to still further reduce the prospects; have advocated spraying with arsenate of lead for controlling the slug. Plums: Generally a good crop; Japanese varieties are affected more or less with black aphis. Raspberries: Look well in isolated cases, but I am inclined to think the yield will be below the average. Strawberries: In a few instances only can this crop be considered a good one; a variety known as Melba in the Ashburton district is doing really well, and shows to an extent immunity from leaf-spot fungus. Tomatoes: Under glass in Ashburton district a disease has broken out among the plants, the leaves turning a sickly yellow, with fungus-spores on the under-surface; the grower has sprayed plants with permanganate of potash, which appears to have given efficient results; there are large areas planted in the open, and the weather-conditions prevailing have been most favourable for their growth; in one or two houses the fruit will be ripe for Christmas. Walnuts: The prospective crop in sight is a good one; young walnuts planted out last season are growing well. The latter portion of the month has been cold and wet.—*A. B. Mansfield.*

DUNEDIN.—Cherries: Picking commenced. Gooseberries: Picking in full swing. Strawberries: Heavy crops now being picked. All fruits are looking very well. Powdery mildew and pear-mite are much in evidence this season, being more prevalent than has been noticed in previous seasons. The effectiveness of red-oil emulsion for controlling San Jose scale has been proven this past winter at Alexandra. Several growers, acting under my advice, applied it at the strength of one part of emulsion to eight parts of water, and completely eradicated this scale insect with absolutely no harm to the trees. Orchardists in this district are realizing the benefits to be obtained by keeping bees for pollination purposes, and many growers are now installing one or two colonies where previously no bees were kept.—*W. T. Goodwin.*

MARKET CONDITION OF LOCAL FRUIT AND VEGETABLES.

THE Fruit Inspectors of the Orchards, Gardens, and Apiaries Division report as follows on the condition of locally grown fruit and vegetables in the shops and auction-rooms, and the market position of these, for the month of November:—

WELLINGTON.—Very small consignments of apples to hand; they are realizing satisfactory prices. Strawberries are coming in in large supplies, and are meeting with good demand. All vegetables are bringing satisfactory prices. Owing to the strike, citrus and deciduous fruits are scarce, due to the boats being held up. Lately the outlook is more promising, and cold-storage apples are beginning to come forward. New potatoes are in good supply; old potatoes are practically unsaleable.—*T. C. Webb, jun.*

CHRISTCHURCH.—Cherries and strawberries are coming forward freely, the latter are inclined to be on the small side. Cherries are realizing 8d. to 1s. per lb.; strawberries, 7d. to 1s.; tomatoes, 1s. to 1s. 6d., according to supply; gooseberries, 2½d. to 3d. per lb.; cucumbers, 8d. to 9d. per lb.; new potatoes, 3½d. to 4½d.; old potatoes, £1 10s. per ton; peas, 1s. 6d. to 2s. per peck. Other vegetables in plentiful supply.—*G. Esam.*

DUNEDIN.—At the beginning of the month only small lots of strawberries came forward, but after the first fortnight the supply increased considerably; the fruit was in good order and of good quality. Cherries in good order, but only small lots coming forward at present. Small supplies of hothouse tomatoes are

coming to hand from Christchurch. There are still a few lines of Canterbury apples and pears arriving on this market. A few local-grown grapes were on the market during the month, but owing to the price required by the grower these did not meet with a ready sale. Gooseberries in good order; only small lots coming forward. There has been a fairly good supply of the following vegetables —viz., Cabbages, cauliflowers, green peas, lettuce, rhubarb, leeks, new potatoes, asparagus, and carrots. Prices for the month ruled as follows: Strawberries, 6d. to 1s. per pottle, up to 1s. 8d. for extra choice; cherries, 10d. to 1s. 2d. per lb.; tomatoes, 1s. 6d. to 1s. 10d. per lb.; grapes, 3s. per lb.; gooseberries, 3¾d. to 4½d. per lb.; apples, 8s. 6d. to 9s. 6d. per case; pears, 7s. to 8s. per case; cabbages, 3s. to 4s. per sack; cauliflowers, 4s. to 5s. per sack; asparagus, 4s. to 5s. per dozen bundles; green peas, 3½d. to 6d. per lb.; new potatoes, 2d. to 4d. per lb.—*E. T. Taylor.*

HONEY-CROP PROSPECTS.

THE Director of Orchards, Gardens, and Apiaries Division has received the following reports on the honey-crop prospects from the Apiary Instructors:—

AUCKLAND.—The weather during November has been very showery and boisterous, and the bees have gathered very little honey. The prospects for good honey crops do not now seem so bright, although there is an abundance of white clover in blossom. There is still time, however, for a good flow if we can get fine hot days during December and January. There is a good demand for honey in 2 lb. tins, but little coming forward, as beekeepers have now sold last season's crop.—*G. V. Westbrooke.*

WELLINGTON.—Recent stormy weather curtailed honey-gathering considerably, necessitating unusual artificial feeding at this period of the year. However, colonies generally are in good condition, and with fine weather a heavy crop should result. There is every indication that future prices will show a slight advance.—*F. A. Jacobsen.*

PRODUCE IMPORTED.

THE following return, compiled by the Customs Department, shows the total importations into New Zealand during the month of November, 1913, of agricultural and farm products:—

Item.	Quantity.	Value in
		£
Bran	..	..
Butter	..	..
Cheese	10 cwt.	29
Chaff	41 tons	245
Fruits, fresh; all kinds	1,565,506 lb.	16,466
Barley	45 centals	42
Oats	117 ,,	37
Wheat	..	..
Onions	3,205 cwt.	1,763
Pollard and sharps	..	..
Potatoes	5 tons	35
Seeds, grass and clover	1,157 cwt.	2,442
Total value imported ..	..	£21,059

THE DOMINION'S EXPORTS TO BRITAIN.

Compiled from Manifests of Vessels sailed during Respective Months of Current and Preceding Seasons.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.	Sundry.
January,	1913	166,714	229,179	6,886	109,251	63,864	118,986	..	329	..	6,969	2,215	4,110	611 carcases pork.
,,	1912	237,284	302,399	12,424	114,512	64,005	95,994	..	..	7,295	6,365	1,942	3,407	59 ,,
February,	1913	326,337	403,698	12,666	89,098	81,733	127,968	..	..	..	12,520	4,295	7,973	64 carcases pork.
,,	1912	208,424	273,246	13,052	101,544	62,398	106,074	607	..	..	6,831	1,615	1,056	..
March,	1913	86,224	210,166	7,428	47,560	59,844	49,661	..	115	..	12,552	7,662	4,043	250 carcases pork.
,,	1912	324,192	518,402	20,201	64,925	49,308	70,022	..	4,980	..	3,832	1,352	2,644	16 ,,
April,	1913	303,937	647,948	16,834	11,358	52,934	61,988	..	300	..	9,049	3,351	3,889	457 carcases pork.
,,	1912	213,178	355,829	7,046	38,986	38,137	31,615	4,905	2,180	..	5,134	1,958	4,458	..
May,	1913	418,221	731,520	22,073	637	46,304	33,281	..	265	2,000	15,751	5,005	9,057	100 carcases pork.
,,	1912	454,506	744,287	32,691	1,441	40,535	51,833	11,157	26,569	1,500	11,963	2,826	6,287	..
June,	1913	315,034	528,815	24,444	79	3,166	18,741	..	..	13,072	13,592	4,065	5,439	588 carcases pork.
,,	1912	170,738	287,697	24,605	558	7,712	18,138	9,160	7,622	2,039	5,646	1,168	1,213	221 ,,
July,	1913	215,713	331,353	14,030	..	1,687	17,169	5,651	300	9,190	9,682	1,720	10,793	..
,,	1912	291,097	371,474	29,457	684	1,255	16,567	44,324	23,216	20,573	7,463	1,856	5,892	210 carcases pork.
August,	1913	161,593	178,263	13,129	8	407	8,494	11,604	45	38,480	3,714	2,310	6,406	6 carcases pork.
,,	1912	207,239	157,589	10,478	559	..	10,409	42,580	38,802	19,562	3,758	523	4,219	..
September,	1913	133,122	83,521	5,334	6,575	2,020	7,176	..	..	16,336	3,826	1,501	10,049	16 carcases pork.
,,	1912	44,657	40,759	1,174	8,723	1,204	6,671	15,742	17,363	19,933	2,957	501	3,671	..
October,	1913	14,122	25,735	580	42,847	21,452	2,705	..	..	10,020	6,986	3,672	2,923	..
,,	1912	51,263	15,393	3,882	49,962	16,389	4,647	7,952	64,480	5,395	4,193	401	9,075	..
November,	1913	20	1,479	..	53,468	23,722	1,891	..	..	2,478	4,162	771	2,314	..
,,	1912	54,175	8,286	282	140,751	57,181	33,305	3,680	40,896	13,892	9,866	1,911	5,466	..
December,	1912	117,740	106,310	4,774	119,885	66,213	44,789	5,868	30,490	10,070	3,816	2,613	3,686	..
,,	1911	72,192	91,965	765	109,397	46,883	54,297	..	..	4,366	5,719	1,364	2,708	..

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE THREE MONTHS ENDED 30TH NOVEMBER, 1913.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. Hinds.	Beef. Fores.	Butter. New Zealand.	Butter. Danish.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila.	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila.	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
1913.							d.	d.	d.	d.	d.	d.															
Sept. 6	..	..	..	..	..	..	$4\frac{3}{8}$	$4\frac{1}{4}$	$5\frac{5}{8}$	$5\frac{1}{4}$	..	..	126/0	..	68/0	..	67/0	30/10/0	26/0/0	31/0/0	31/0/0	26/10/0	30/10/0	37/0	38/6	..	..
„ 13	..	..	..	..	..	..	$4\frac{1}{2}$	$4\frac{3}{8}$	$5\frac{11}{16}$	$5\frac{3}{8}$	$4\frac{7}{16}$	3	..	130/6	68/0	..	66/6	30/0/0	25/10/0	31/0/0	30/0/0	25/5/0	30/5/0	..	..	..	..
„ 20	$1/3\frac{1}{4}$	$1/3\frac{3}{4}$	$1/4\frac{1}{2}$	$1/7\frac{3}{4}$	$1/10\frac{1}{2}$	$2/3\frac{3}{4}$	$4\frac{5}{8}$	$4\frac{1}{2}$	..	..	$4\frac{1}{4}$	$3\frac{1}{8}$	..	..	..	..	..	29/10/0	25/5/0	30/0/0	29/10/0	25/5/0	29/10/0	..	..	..	..
„ 27	..	..	..	..	..	..	..	..	..	$5\frac{1}{4}$	$4\frac{1}{2}$	3	..	..	..	..	..	30/0/0	26/0/0	30/10/0	30/0/0	26/0/0	30/0/0	..	36/0	..	..
Oct. 4	..	..	..	..	..	..	$4\frac{5}{8}$	$4\frac{7}{16}$	$5\frac{5}{8}$	$5\frac{3}{16}$	$4\frac{3}{4}$	..	..	..	..	..	..	29/15/0	25/15/0	30/0/0	29/15/0	..	30/0/0	..	..	..	..
„ 11	..	..	..	..	..	..	..	..	$5\frac{9}{16}$	$5\frac{1}{16}$	$4\frac{1}{4}$	$3\frac{1}{4}$	..	..	..	..	..	..	..	30/0/0	29/15/0	25/15/0	26/10/0	..	36/0	23/0	20/6
„ 18	..	..	..	..	..	2/4	$4\frac{5}{8}$	$4\frac{3}{8}$	$5\frac{11}{16}$	$5\frac{11}{16}$	$4\frac{1}{2}$	$3\frac{3}{8}$	..	134/6	..	..	65/6	29/0/0	25/15/0	30/10/0	29/10/0	26/0/0	30/10/0	..	..	..	..
„ 25	..	..	..	..	..	..	..	..	$5\frac{1}{2}$	$5\frac{1}{8}$	$4\frac{3}{8}$	$3\frac{5}{16}$	..	134/6	..	..	..	29/5/0	25/15/0	30/10/0	29/5/0	25/15/0	30/0/0	..	..	..	..
Nov. 1	..	..	..	..	..	..	$4\frac{5}{8}$	$4\frac{7}{8}$	$5\frac{3}{8}$	$5\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{5}{8}$	..	135/0	..	..	..	29/5/0	25/15/0	30/10/0	29/5/0	25/15/0	30/5/0	..	..	..	..
„ 8	..	..	..	..	..	..	$4\frac{5}{8}$	$4\frac{1}{2}$	$5\frac{3}{8}$	$5\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{5}{8}$	128/0	132/0	64/0	64/0	65/0	28/15/0	25/15/0	30/10/0	28/15/0	25/15/0	29/15/0	..	35/6	..	..
„ 15	$1/3\frac{1}{4}$	$1/3\frac{1}{2}$	1/4	1/7	1/10	$2/3\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{5}{8}$	$5\frac{1}{2}$	$5\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{3}{4}$	126/0	131/0	64/0	64/0	66/0	28/10/0	25/10/0	30/5/0	..	..	29/15/0	..	..	..	..
„ 22	..	..	..	..	..	..	..	$4\frac{3}{4}$	..	..	..	..	126/0	131/0	64/0	65/0	67/0	28/5/0	25/10/0	30/0/0	28/10/0	25/15/0	29/10/0	..	..	..	..
„ 29	1/3	$1/3\frac{1}{2}$	$1/3\frac{3}{4}$	1/7	$1/9\frac{1}{2}$	2/3	..	$4\frac{3}{4}$	$5\frac{3}{8}$	..	$4\frac{1}{2}$	$3\frac{7}{8}$	128/0	..	65/0	65/6	68/0	28/0/0	25/17/6	30/0/0	27/12/6	25/5/0	29/10/0	..	..	..	..

AVERAGE PRICES FOR NEW ZEALAND PRODUCE.

TABLE SHOWING THE AVERAGE PRICES REALIZED MONTHLY IN LONDON FOR THE UNDERMENTIONED PRINCIPAL LINES OF NEW ZEALAND PRODUCE DURING THE YEARS 1911–13.

Month.	Lamb, per Pound.						Mutton, per Pound.						Beef, per Pound, Hind Quarters.			Butter, per Cwt.			Cheese, per Cwt.			Hemp, Good-fair on Spot, per Ton.			Cocksfoot-seed, per Cwt.		
	Canterbury.			North Island.			Canterbury.			North Island.																	
	'11.	'12.	'13.	'11.	'12.	'13.	'11.	'12.	'13.	'11.	'12.	'13.	'11.	'12.	'13.	'11.	'12.	'13.	'11.	'12.	'13.	1911.	1912.	1913.	'11.	'12.	'13.
	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	s.	s.	s.	s.	s.	s.	£ s. d.	£ s. d.	£ s. d.	s.	s.	s.
Jan. ..	5⅞	..	6⅛	5⅝	5⅝	5⅝	4½	4½	4½	4⅛	4⅛	4⅛	3½	4⅛	4	108	132	132	58/6	73/	73/	20 5 0	21 15 0	22 0 0	73	..	..
Feb. ..	5¾	..	5⅞	5⅜	5½	5⅜	4¼	..	..	4	4	4	3¾	..	4½	105	132	132	59/6	72/	72/	19 5 0	21 5 0	21 5 0	74	74	75
Mar. ..	5⅛	5⅝	5⅝	5⅝	5⅛	5⅛	3¾	4¼	4⅛	3⅜	3¾	3½	3¼	4	4	106	127	127	59/	73/6	73/6	20 0 0	21 10 0	21 10 0	75	75	..
April ..	4⅞	..	5¾	4¼	..	5⅜	3⅝	..	4½	3⅛	..	4	4	..	4¼	109	..	117	62/	..	72/	20 0 0	..	21 15 0	76	..	..
May ..	4⅝	..	6⅛	4¼	..	5⅞	3⅝	..	4⅜	3	..	3⅞	3⅞	..	4½	106	..	112	60/	..	71/6	20 5 0	..	21 15 0	77	..	..
June ..	4⅞	..	6¾	4¾	..	6¼	4	..	4⅜	3½	..	4	3¾	..	4½	106	..	114	58/	..	73/	21 0 0	..	22 0 0	..	..	..
July ..	5⅛	..	6⅛	4⅞	..	5⅞	3⅞	..	4⅛	3⅝	..	4	3⅜	..	4¼	110	..	114	60/	..	66/6	21 0 0	..	23 17 6	..	..	67
Aug. ..	5½	..	5⅞	5¼	..	5½	3⅞	..	4⅜	3¾	..	4¼	4	..	3⅞	..	..	116	64/	..	65/	20 0 0	..	26 13 0	..	..	..
Sept. ..	5¼	..	5¾	5⅛	..	5½	4⅛	..	4⅝	3¾	..	4½	3⅝	..	3⅞	..	..	121	67/	..	67/	19 15 0	..	27 12 6	..	..	..
Oct. ..	5⅛	..	5⅝	4¾	..	5⅜	4⅛	..	4⅝	3¾	..	4½	3½	..	3⅝	..	..	129	..	..	..	20 0 0	..	31 5 0	..	..	..
Nov. ..	5⅛	..	5⅝	4¾	..	5⅜	4¼	..	4⅝	3⅞	..	4⅜	3½	..	3⅜	131	..	119	68/	..	61/	20 0 0	..	33 16 0	..	..	..
Dec. ..	5¼	..	5¾	4¾	..	5⅝	4⅜	..	4⅞	4	..	4¾	3¾	..	3¾	131	..	123	69/	..	61/	20 0 0	..	33 2 6	..	..	..

Beef fore quarters average ¾d. per pound less than hind quarters.

AVERAGE PRICES FOR NEW ZEALAND WOOLS.

STATEMENT SHOWING AVERAGE PRICES FOR NEW ZEALAND WOOLS AT THE COLONIAL WOOL-SALES HELD IN LONDON FROM 1st APRIL, 1912, TO 31st MARCH, 1913.

London Date.		Merino. Superior.	Merino. Medium.	Merino. Inferior.	Crossbreds. Fine.	Crossbreds. Medium.	Crossbreds. Coarse.	Bales catalogued, New Zealand.	Bales sold, New Zealand.	Bales held over, New Zealand.
1912.		d. d.	d. d.	d. d.	d. d.	d. d.	d. d.			
April 12	2nd series	12 to 13½	9½ to 11	7½ to 9	11½ to 12½	8 to 10½	7 to 10	120,300	..	..
May 4		13 ,, 13½	9½ ,, 11½	7½ ,, 9	11 ,, 13½	8½ ,, 11	7½ ,, 10½	..	112,600	7,700
July 2	3rd series	13½ ,, 14	10 ,, 12	8 ,, 9½	11¼ ,, 13¾	9 ,, 11½	7¾ ,, 10¾	152,000	..	..
Aug. 2		12 ,, 14	9½ ,, 11½	7½ ,, 9	12 ,, 14½	9½ ,, 12	8 ,, 11	..	135,000	17,000
Sept. 23	4th series	12 ,, 14	9½ ,, 11½	7½ ,, 9	12½ ,, 14	10 ,, 12½	8¾ ,, 11¾	77,600	..	..
Oct. 10		12½ ,, 14	10 ,, 12	8 ,, 9½	12½ ,, 15	10½ ,, 13	9 ,, 12	..	73,400	4,200
Nov. 26	5th series	13½ 15	11 ,, 13	9 ,, 10½	13½ ,, 16	11½ ,, 14	10 ,, 13	18,500	..	..
Dec. 7		13 15½	11 ,, 13	9 ,, 10½	13 ,, 15½	11 ,, 13½	9½ ,, 13	..	18,500	500
1913.										
Jan. 14	1st series	13 to 15½	11 to 13	9 to 10½	13 to 15½	11 to 13½	9½ to 13	33,500	..	..
,, 29		13½ ,, 15½	11 ,, 13	9 ,, 10½	13 ,, 15½	11 ,, 13½	9½ ,, 13	..	32,500	1,000
March 4	2nd series	13½ ,, 15½	11 ,, 13	9 ,, 10½	13 ,, 15½	11½ ,, 14	10 ,, 13½	76,400	..	..
,, 19		13½ ,, 15½	11 ,, 13	9 ,, 10½	13 ,, 15½	10 ,, 12½	9 ,, 12	..	66,600	9,800

HEMP AND TOW GRADING RETURNS.

NOVEMBER.

Hemp.—The total number of bales graded was 13,294, as compared with 10,672 for the corresponding month of last year, an increase of 2,622 bales. For the twelve months ending 30th November, 1913, the number of bales graded was 165,595, as compared with 95,047 for the previous twelve months, the increase being 70,548 bales.

Tow.—During the month 4,469 bales were dealt with, as compared with 4,045 for the corresponding month of last year, an increase of 424 bales. For the twelve months ending 30th November, 1913, the number of bales graded was 56,945, as compared with 28,665 for the previous twelve months, an increase of 28,280 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF NOVEMBER, 1913.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	333	916	440	71	4	..	1,764
Napier ..	..	..	232	31	..	..	..	..	263
Foxton ..	..	..	912	2,287	452	204	15	..	3,870
Wellington ..	..	..	1,824	1,798	520	44	61	..	4,247
Blenheim ..	..	106	386	..	..	..	..	..	492
Picton ..	..	105	187	16	..	..	..	..	308
Lyttelton ..	..	54	..	..	..	..	..	..	54
Dunedin ..	..	..	139	124	71	4	..	..	338
Bluff	..	..	660	718	476	104	..	..	1,958
Totals ..	..	265	4,673	5,890	1,959	427	80	..	13,294
Percentages of totals	..	1·99	35·15	44·31	14·74	3·21	0·60	..	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	251	379	77	707
Napier	44	..	14	..	58
Foxton ..	173	665	223	6	1,067
Wellington ..	101	572	452	29	1,154
Blenheim ..	93	37	..	..	130
Picton	..	155	..	13	168
Lyttelton ..	..	216	35	..	251
Dunedin ..	..	21	141	1	163
Bluff	..	194	521	56	771
Totals ..	411	2,111	1,765	182	4,469

Stripper-slips.—Passed for export: Auckland, 25; Foxton, 464; Wellington, 105; Lyttelton, 19; Bluff, 14—total, 627. Condemned: Foxton, 51; Wellington, 8—total, 59.

NEW ZEALAND-SAN FRANCISCO TRADE.

FOLLOWING are the shipments of produce for San Francisco, Tahiti, and Rarotonga, and transhipments for Vancouver from New Zealand, since July last:—

—	"Tahiti," 18th July.	"Moana," 15th August.	"Willochra," 13th Sept.	"Tahiti," 10th Oct.	"Moana," 13th Nov.
Gum, packages	6	34	..	21	..
Seeds, sacks	450	23	120	365	..
Grain, &c., sacks	75	72	28	76	34
Meat, cases	152	205	60	950	240
Onions, cases	5	10	2	..	..
Potatoes, sacks	9	15	3	9	2
Sundries, packages	370	157	422	247	16
Butter, boxes	792	7	545	4,415	4,198
Hemp, bales	371	391	377	..	131
Frozen lamb, carcases	2	2	2	2	2
,, mutton, ,,	30	54	..	..	..
,, veal, ,,	..	..	..	..	..
,, beef, quarters	32	..	..	..	..
,, sundries, packages	5	5	7	..	..
Timber, pieces	..	..	..	136	..

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since July last:—

—	"Marama," 6th June.	"Makura," 5th July.	"Niagara," 2nd August.	"Marama," 30th August.	"Makura," 27th Sept.	"Niagara," 25th Oct.
Butter, boxes	1,210	4,401	720	1,753	10,062	18,335
Mutton, carcases	50	65	1,014	1,500	1,119	1,189
Beef, quarters	2,271	3,520	7,195	4,217	955	259
Veal, carcases	..	..	..	74	171	291
Frozen sundries, packages	90	471	42	..	2,202	12
Wool, bales	351	835	..	103	207	320
Grass-seeds, beans, &c., sacks	..	75	..	38	9	..
Hides and skins, sacks, &c.	1,675	748	200	1,468	3,533	4,144
Onions, cases	..	..	..	..	..	..
Sheep-skins, bales	..	522	..	..	..	146
Jam, cases	75	20	1	53	..	74
Sundries, packages	103	189	..	1,406	2,586	1,018
Potatoes, crates	..	..	..	..	..	..
Kauri-gum, packages	44	..	..	..	180	267
Hemp, bales	167	97	930	116	284	380
Rabbits, crates	500	15	100	500	..	100
Timber, pieces	..	..	..	..	2,819	2,709
Eggs, cases	..	..	..	..	..	336
Meats (canned, &c.), cases	..	..	..	..	..	60
Fertilizers, sacks	..	..	..	..	..	914

STOCK IN QUARANTINE.

THE following stock were received into quarantine during the month of November:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			MOTUIHI ISLAND (AUCKLAND).		
1	Staghound ..	Male..	Vanconver	R. Brown ..	Auckland.
1	Bull-terrier ..	,,	,,	E. Davis ..	,,
1	Fox-terrier ..	,, ..	Liverpool	G. R. Hutchison ..	,,
1	Mexican spaniel ..	,, ..	Sydney ..	F. J. Mahoney ..	,,
1	Shorthorn bull ..	..	London ..	G. E. Churches ..	Te Awamutu.
			SOMES ISLAND (WELLINGTON).		
2	Pomeranian dogs	Male..	London ..	H. Crompton ..	Greymouth.
2	,,	Female	,, ..	,, ..	,,
4	Southdown rams..	..	,, ..	J. E. Lane ..	Hastings.
1	Southdown ram ..	..	,, ..	Hugh Campbell ..	,,
1	,, ..	..	,, ..	S. R. Lancaster ..	Palmerston North.
1	Skye terrier ..	Female	,, ..	Miss Kerr ..	Auckland.
			QUAIL ISLAND (LYTTELTON).		
1	Pomeranian dog ..	Male..	London ..	George Lewis ..	Christchurch.
5	Southdown rams..	..	,, ..	Dalgety and Co. ..	,,
1	Southdown ewe ..	..	,, ..	,, ..	,,
2	Polled Angus bulls	..	,, ..	Murray, Roberts, and Co.	Dunedin.
1	Airedale terrier ..	Male..	,, ..	William Knowles..	Christchurch.
1	,, ..	Female	,, ..	,, ..	,,
1	Cocker spaniel ..	,,	,, ..	J. H. Pugh ..	,,

STOCK EXPORTED.

THE following stock was exported from the Dominion during the month of November:—To Australia: From Auckland, 10 Romney rams; from Wellington, 7 ponies (4 stallions, 1 mare, and 2 geldings).

The s.s. "Athenic," which sailed from Wellington on the 18th ultimo, had on board the following produce for Monte Video: From Wellington—23 cases of crayfish, 15 live rams; from Lyttelton—250 sacks of oats.

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